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Here is Why Whirler Action is So Important Today in Washing Formation, Removing Bridges, and Cementing

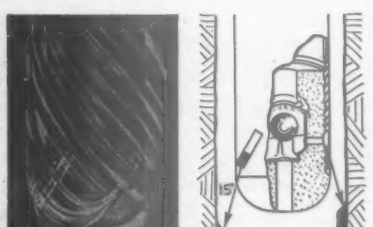
Under today's conditions, the securing of a successful first-time cement job is more than just "important" . . . *it is vital!* We can't afford to lose the additional man hours, rig time and materials required for a "second-time" job. They are needed to drill and cement a second well—not for second-time use on the same well.

Baker's contribution to this war-time problem, is making available cementing devices which afford every possible opportunity for securing successful results the *first time.*

An outstanding example of such a device is the *Baker Cement Wash-Down Whirler Float Shoe (usually used in combination with a Baker Cement Float Collar). This shoe not only assures safe and proper landing of the casing, but through its efficient "whirler action" provides best possible chance for complete encasement of the pipe with a uniform body of cement, with the hazard of channeling reduced to a minimum. In addition, when the cement job is completed, the internal construction of the Baker Cement Wash-Down Whirler Float Shoe can quickly and easily be drilled out leaving no harmful fragments in the hole to interfere with further deepening operations.

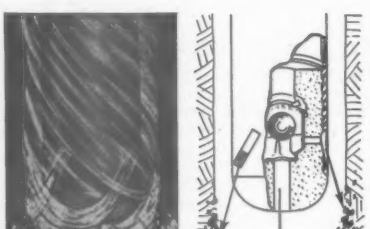
Field results have indicated that the whirler action afforded by Baker Cement Wash-Down Whirler Equipment is both effective and advantageous in washing formation, removing bridges and particularly in securing a better cementing job. ★ The whirling motion imparted to the fluid as it leaves the Shoe, is the basic reason for the unit's remarkable effectiveness. Another contributing factor is the slight angle from the vertical at which the fluid leaves the ports (there is no direct jetting action against the side walls of the hole). ★ The results operators are securing in landing and cementing casing with Baker Cement Wash-Down Whirler Equipment bears out the soundness of the engineering principles incorporated in these units. The illustrative sketches below (not drawn to scale) show these principles in operation.

WASHING FORMATION



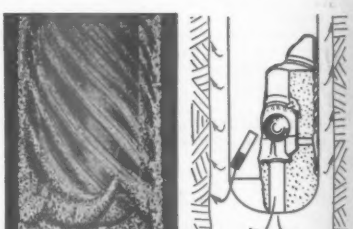
Note that the fluid is discharged through the baffled whirler ports at a slight angle from vertical (approximately 15°), effectively washing and removing at least a portion of the mud cake. There is no direct lateral jetting action against the side walls of the hole.

REMOVING BRIDGES



The angle of discharge through the baffled whirler ports of the Shoe directs the fluid against the *sides of the bridge.* The fluid which is discharged through the bottom of the Shoe also simultaneously attacks the center of bridge.

CEMENTING RESULTS



Uniform cement distribution is provided by effective whirling action imparted to fluid as it leaves the Shoe. Scouring action of the fluid preceding the cement, as well as scouring action of the first slurry as it strikes the formation, cleans the walls and affords best possible bond between the cement and formation at critical point—the Shoe and the Shoe joint.

Service Note
Competent Baker men will advise, make suggestions, and otherwise assist in securing best possible results.

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Central Division Office and Factory:
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Export Sales Office:
19 Rector Street, New York, N. Y.

ARMY E NAVY
Awarded to Los Angeles Plant—1943

BAKER OIL TOOLS INC. BAKER SERVING THE WORLD

the OIL AND GAS JOURNAL

Trends

Crude-Oil Production
By States—Page 283

CRUDE-OIL STOCKS 238,148,000 bbl. as of Jan. 15—up 34,000. One year ago 232,847,000 bbl.

GASOLINE STOCKS 78,405,000 bbl. as of Jan. 15—up 751,000 bbl. One year ago 83,585,000 bbl.

RESIDUAL FUEL-OIL STOCKS 54,529,000 bbl. as of Jan. 15—down 1,202,000. One year ago, 71,773,000.

GAS OIL AND DISTILLATE 39,099,000 as of Jan. 15—down 2,410,000. One year ago 42,007,000.

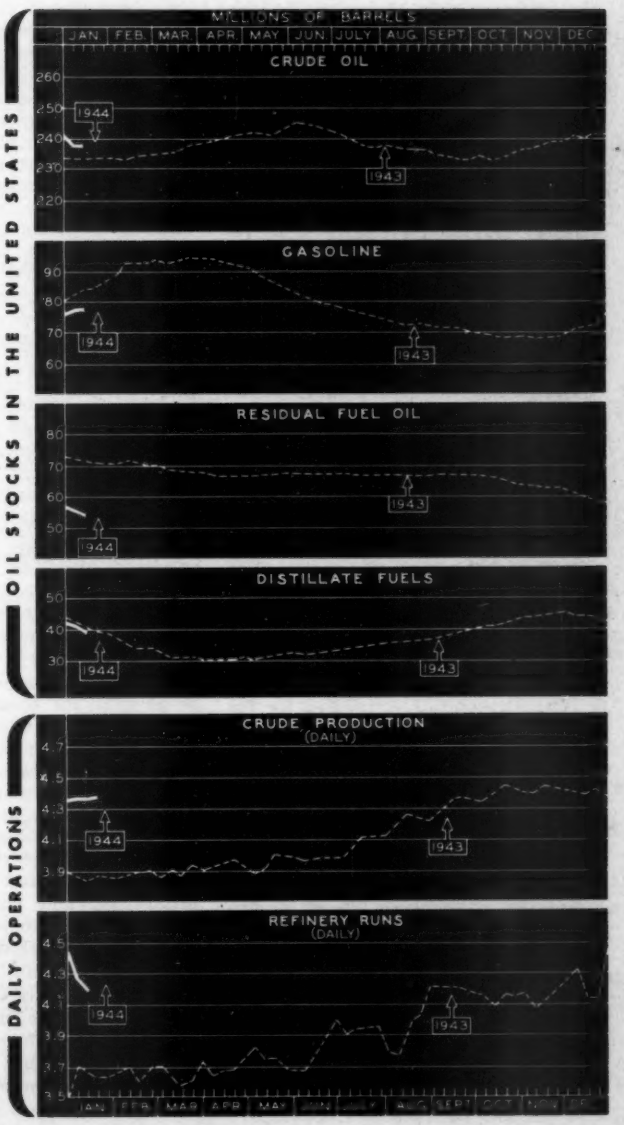
CRUDE-OIL PRODUCTION 4,391,355 bbl. daily average—up 16,700 bbl. One year ago 3,849,325.

REFINERY RUNS 4,203,000 bbl. daily week ended Jan. 15—down 61,000 bbl. One year ago 3,575,000.

PAW officials last week in a memorandum saw fit to call special attention to the steadily increasing production of natural gasoline and associated products. The projected output for February of natural gasoline and condensate is 282,600 bbl. daily, which compares with a natural-gasoline output of 200,000 bbl. daily in November 1941. Plans under way point to a substantial increase in condensate output during 1944, through construction of new cycling plants. Because natural-gasoline manufacture and cycling are closely allied in many operations this expansion will mean gains in the production of all the fractions of natural gasoline. Development of large condensate reserves has been retarded due in part to a situation in which strictly war operations have been favored in the matter of building materials.

WITH the peak in the construction of petroleum war plants to be passed early this year there will be more materials and manpower available to build these condensate plants, and several are either under construction or planned for this year. It is expected that as these new plants are completed and the scope of operations is determined important new oil reserves will be added to the nation's totals. Very little is known now of the extent of some of the fields in which the petroleum liquids can be recovered in cycling operations only.

IT is pointed out that the demand for natural gasoline and associated products becomes increasingly heavy, a development for which war conditions are partly responsible. Some of the lighter fractions are being used directly in the blending of aviation gasolines. The demand for the butanes and propane as raw materials in the manufacture of 100-octane gasoline and synthetic rubber components is also increasing. The outlets for liquefied gases are limited only by the supplies available. In the plans for 1944 the 100-octane programs get first call on the supplies of these lighter hydrocarbons, followed by the war industries and the military and domestic fuel uses. Within the oil country increased drilling operations are bringing enlarged demands for butane for fuel, with shortages reported in several sections. Within the next few weeks the large seasonal demand for butane as domestic fuel will be over and special efforts will be made to provide larger quantities for use in drilling operations.



Proposed Abolishment of PRC May Throw Foreign Oil Issue Into Politics

by Henry D. Ralph

SEN. E. H. MOORE

WASHINGTON, D. C.—A resolution requiring the dissolution of the Petroleum Reserves Corp. and its liquidation within 12 months was introduced in the Senate January 21 by Senators E. H. Moore of Oklahoma and R. O. Brewster of Maine.

The preamble to the resolution recites the history of PRC, mentions the announced opposition of oil industry groups to government competition in foreign-oil activities, and declares that the purpose of PRC set forth in its charter are not compatible with respect for sovereignity of other nations.

In a joint statement the authors of the resolution declared that the legality of PRC is doubtful, government ownership of foreign oil properties is contrary to this country's international policies, and the existence of the corporation is a threat to private enterprise.

Introduction of this resolution coincided with the return to Washington of the PRC mission to the Middle East headed by E. DeGolyer, with the exception of William E. Wrather, director of the U. S. Geological Survey, who was delayed abroad by illness. Members of the mission were enjoined to secrecy regarding what they did abroad or what they are reporting.

If this resolution is pressed for enactment and hearings are held by a Senate committee it may throw into politics the entire subject of foreign operations by United States oil companies and the formation of an international oil policy by this Government.

So far PRC has not acquired any properties or facilities abroad or undertaken any physical activities. It has made a number of studies and proposed plans, and has been consulted on military matters related to petroleum supplies, but these activities have been surrounded with complete secrecy. As far as can be learned, PRC has done nothing because of its corporate form that could not have been done by some ordinary unit of a regular government agency, such as the Department of State or the new Foreign Economic Administration.

Throughout its history, PRC has been surrounded with more mystery and more suspicion than any other government creation. Its charter permits it to engage in the oil business abroad, but there have never been any statements of policy or intent, and this fact apparently has put PRC in the middle of a tug-of-war. On one side are United States oil companies, particularly those with foreign holdings, who see in PRC a threat of government ownership and competition. On the other side are persons in the administration and outside of it who favor government ownership and strict regulation of industry and who see PRC as a convenient instrument for promoting these objectives.

Original Purposes Abandoned

Persons close enough to the inner workings of PRC to know something of its original purposes declare that it was conceived to do certain things (of unspecified nature) which needed to be done for successful prosecution of the war and which could not have been done as well by either private oil companies or regular operations of existing government agencies. However, they add, the mystery thrown around PRC created so much suspicion and distrust that the organization may have lost all possibility of usefulness, and some other means may now have to be used to accomplish the original objectives — whatever they were.

The president of PRC, ex officio, is Secretary of the Interior Harold L. Ickes, directors being the secretaries of State, War, Navy and the foreign-economics administrator. There is no evidence that any of these officials except Ickes have shown much interest in PRC. Recently both the State Department and the FEA have undergone internal reorganizations, but neither has affected the PRC, at least outwardly. Neither is there evidence that the White House has intervened in PRC internal operations, although Ickes is understood to have discussed policy matters with the President.

It is possible that the Moore-Brewster resolution may bring into the open the real objectives and activities of PRC, though if these are really military secrets they probably will not be discussed publicly. It is more likely that discussion of the resolution may result in political arguments over the foreign-economic policy of the United States, including the part alleged to be played by major oil companies in influencing that policy.

Spacing Modified in Ohio, Indiana, Kentucky

WASHINGTON, D. C.—Restrictions on the use of critical materials in drilling operatons in the so-called "Cincinnati arch-Nashville dome" area embracing certain counties in Indiana, Ohio, Kentucky, and Tennessee were relaxed last week by issuance of Supplementary Order 10 to Petroleum Administrative Order 11.

Under the terms of the new supplementary order, operators are authorized to drill or deepen wells in the areas on 5-acre spacing to a depth not greater than 1,200 ft., and on 10-acre spacing to depths not exceeding 1,800 ft.

Amendment Qualifies All District 2 Refiners for Tank-Car Reimbursement

WASHINGTON, D. C. — Widened utilization of West Texas crude is expected to follow the action of Fred M. Vinson, economic stabilization director, in removing one obstacle which prevented Middle West refiners from participating in Defense Supplies Corp.'s compensatory payments on tank-car shipments from that area. It is believed part of the 205,000 bbl. daily of idle refining capacity in District 2 will be put to work as a result of increased use of West Texas oil. To be eligible to file a claim for reimbursement for extra expense of shipping by tank car a refiner must certify that:

(a) Such shipment is made solely by tank car directly from such point in District 3 to such point in District 2 without any intermediate storage, loading or unloading between such points.

(b) Such shipments is commenced from such point in District 3 on or after December 4.

(c) Such shipment is made pursuant to a shipping schedule approved by the Petroleum Administration for War or is otherwise specifically approved by the Petroleum Administration for War and the volume of crude for which a claim is made does not exceed the quantity specified in the schedule or other approval of the Petroleum Administration for War; and

(d) The freight on such shipment is paid direct to the railroad carrier by such person.

Regulation 5 Changed

Regulation 5, announcing numerous changes in rate of payment in cases where preliminary rates were found to be out of line, and several additions to the list of District 2 refining points, was issued by DSC to become effective December 4 on crude shipments from Levelland, Midland, and McCamey, Tex., to any person who operates a refinery at the listed points in District 2.

Previous rules issued December 4 establishing eligibility for participation in the reimbursement plan restricted the DSC compensation to refiners who were not in the excess-profits bracket. This restriction had worked to exclusion of West Texas oil as a supplementary source of supply. Many of the District 2 refining companies in position to process West Texas sour oils were among those in the excess-profits bracket. Consequently, they declined to incur the higher transportation costs and retained all possible crude-oil connections in District 2. This, of course, prevented diversion of additional volumes of District 2 sweet oil to the plants of operators whose facilities would not stand up under the more severe processing conditions accompanying the manufacture of products from sour crudes.

Manpower Shortage May Become More Critical, Oil Men Told

LITTLE comfort for oil companies grappling with the problem of manpower shortage was afforded at a joint conference of Mid-Continent Oil and Gas Association, Independent Petroleum Association of America, and officials of District 2 Petroleum Administration for War, held January 21 in the Mayo Hotel, Tulsa. Wholehearted cooperation of PAW with oil men seeking their way out of perplexities created by war conditions was assured by W. W. Vandeveer, director in charge of District 2, Chicago. A comprehensive statement by Vandeveer, covering the situation facing the oil industry in the Mid-Continent region, was followed by an open forum, in which questions were invited.

Robert B. Shirk, of the production division of PAW, specializing in manpower problems, was present from Washington, D. C., and he warned that the urgencies of the manpower crisis would become still more pressing within the next 90 days. Oil companies, he said, were likely to lose men who now have critical-employment deferment. He emphasized that relief for oil companies depended largely upon the manner in which they presented their cases to local draft boards.

There had not been uniform interpretation among different states, Shirk said, of the latest revisions of the selective service regulations, with the result that regional boards did not always agree on the way in which the revised regulations were to be applied.

Replying to questions from the floor, Shirk said there was no objection to use of advertisements by oil companies seeking to engage experienced oil workers now employed in other defense occupations. Such advertisements, however, were to be cleared through the Manpower Commission.

Asked to explain the reason it had become difficult to obtain butane for use as an engine fuel in drilling operations, Mark Patton, director of the natural gas and natural-gasoline division of District 2, said a shortage had developed as the result of increasing purchases by the Army and Navy, whose requirements, he pointed out, take precedence over any industrial demand.

Production Stimulant Sought

A goal of 2,565 wildcat wells in 1944 has been set for oil operators in the 14 states comprising District 2, Vandeveer told the oil men. He recounted how daily production in the district had fallen off 20 per cent in the past 2 years, with no hope of this trend being reversed unless substantial new reserves are uncovered by intensive wildcat drilling. Commenting on the shortage of equipment needed for drilling operations, he said PAW is obtaining larger quotas of steel for oil-industry use.

Approximately 7,300 wells of all types were drilled in District 2 in 1943, Vandeveer said. Provision is being made for the material required to drill 8,630 wells in 1944. Many modifications already have been made

to permit closer drilling, and more are expected to be made when needed steel is assured.

"The District 2 office in Chicago," the speaker said, "has now received its 'delegation of authority,' which in effect will permit more prompt handling of the majority of your applications for exceptions for drilling. The authority does not cover all of the various types of requests for exceptions, but it does give the district office more latitude. Some of you have encountered trouble, for instance, with the 'pattern well' requirements in Petroleum Administrative Order 11. If you have a legitimate reason

W. W. Vandeveer, PAW director in charge of District 2, who conferred with Mid-Continent operators last week at Tulsa, Oklahoma City, Okla., and Wichita, Kans.

for requesting a change, which is not contrary to established policy and which will not work undue hardships upon your neighbors, we can now grant such requests in Chicago, thus avoiding the delay of having them passed upon in Washington. Many other types of exceptions come within the delegation.

"The district office is also empowered to deny any request which, in its opinion, is not warranted by the facts nor consistent with the established policy.

"You have probably noted that Petroleum Administrative Order 11, as amended, was issued January 1. The revised order permits the use of materials for deepening, plugging back, reworking and recompletion of wells, provided certain stipulated conditions are met. This change eliminates the necessity of filing many applications for exceptions and is a distinct improvement. Another feature is the latitude permitted in the installation of pumping or other artificial lifting equipment. Still another is the reduction of the distance requirement between wells from 990 ft. to 900 ft.

"Gas-gathering systems may be constructed for connecting authorized wells, provided material cost does not exceed $5,000 and existing facilities are not duplicated. When we can improve our service to the oil industry it is our desire to make whatever changes are necessary.

Uprating Orders Helpful

"One of the most significant accomplishments of the PAW was the uprating to AA-1 on the manufacture of oil-well drilling machinery and oil-producing equipment. This enables 427 petroleum equipment manufacturers to obtain allotments of controlled materials from PAW and to assign an AA-1 preference rating to the purchase of component items required in the manufacture of drilling machinery and producing equipment. This has accelerated deliveries of bearings, castings, gears, crank shafts, and other items.

'More than 500,000 tons of materials are being consumed in petroleum operations during each calendar quarter. This means that every 3 months the equivalent of 250 trainloads of equipment, machinery, and supplies is moving into the hands of the petroleum industry for use in production, transportation, natural gasoline, refining, or distribution operations. This is an average of three full trainloads each day. The largest single item is oil-country tubular goods—casing, tubing and drill pipe."

OPA Studies Subsidy For Oil Operations

WASHINGTON, D. C. — Plans for stimulating oil exploration and production by subsidy, selective price increases, or some means other than a general crude-oil increase are being developed by the Office of Price Administration at the request of Fred M. Vinson, director of the Office of Economic Stabilization.

Judge Vinson recently wrote Ralph K. Davies, deputy petroleum administrator for war, expressing disappointment that PAW had not been able to discover some workable plan for production incentives as requested by him, and stating that as a result of this he was asking OPA to attempt to work out a plan.

OPA officials declared that they are working on several possible schemes to provide financial incentives for increased wildcatting, secondary recovery and operation of marginal producing wells, but these plans are all in a formative state. OPA plans to submit general outlines of its proposals to OES, which is then expected to indicate which scheme is most likely to obtain results, after which OPA will work out further details.

Officials of OPA admit that this agency has neither the legal authority nor the funds to establish a broad system of oil-production subsidies, and that congressional action would be required to make any such plan operative.

Presumably the administration will have the necessary legislation drafted in time to present as an alternative to the Disney bill to require an increase in the ceiling price on crude. While this bill passed the House in December, it has not yet received any action in the Senate.

Exploration Spreads In Latin America

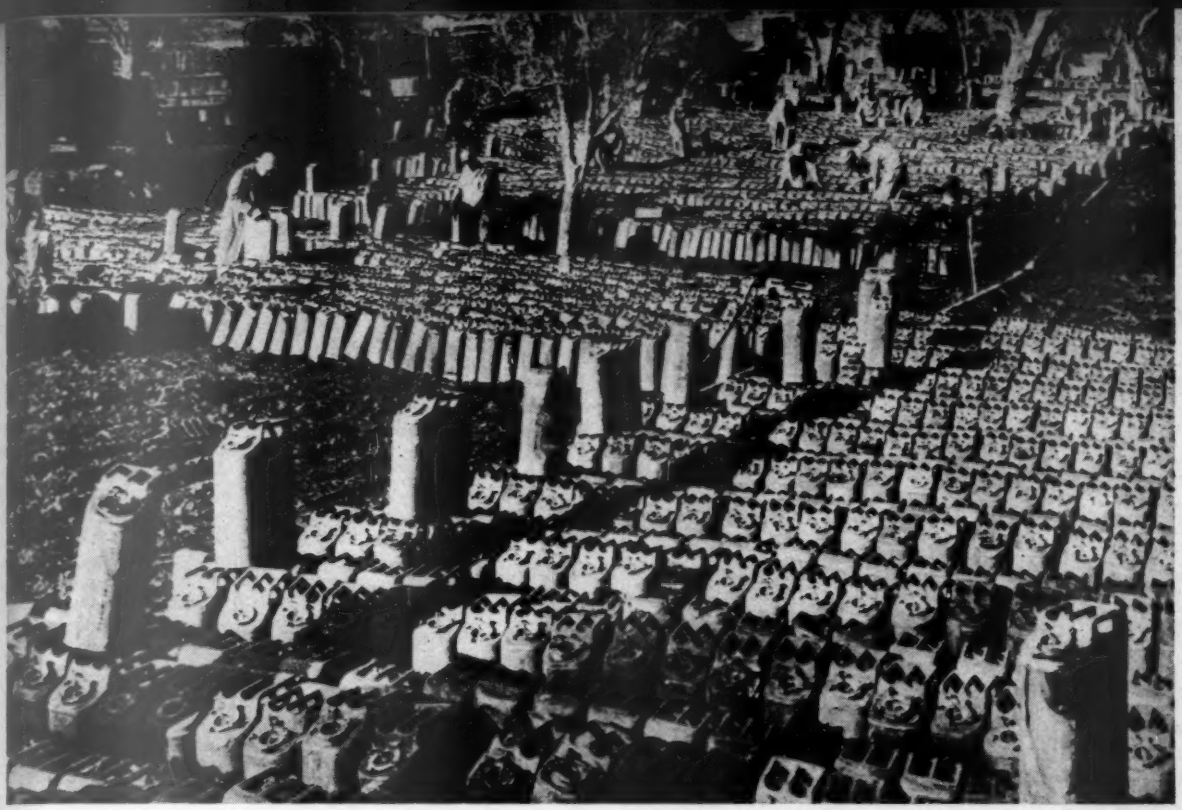
A SECOND exploratory drilling rig is to be added to the one already active in Ecuador, and work is starting on wildcat wells in the Dominican Republic and in the Haiti. This spread of exploration in foreign countries was disclosed in Tulsa last week by C. H. Lieb, president of Creole Petroleum Corp., and other producing affiliated companies of Standard Oil Co. (New Jersey).

International Petroleum Co., Ltd., Toronto, which has drilled three exploratory wells along the coastal zone in Ecuador in the recent campaign is moving another rig to that country. The drilling program has so far failed to develop new production in Ecuador although one wildcat had a gas blowout and another had noncommercial showings of oil.

Dominican Seaboard Oil Co., control of which was acquired by Standard of New Jersy several months ago, is preparing to start a wildcat drilling operation on its holdings in the Dominican Republic. The concession to be tested by Dominican Seaboard was acquired originally by Harold C. Bishop of New York with the support of Seaboard Oil Co. of Delaware.

The Haitian test is being drilled by Atlantic Refining Co. which has conducted a long program of geological and geophysical investigation on that side of the island.

Mr. Lieb said that current production of approximately 650,000 bbl. daily from Venezuela is coming chiefly from the Lake Maracaibo fields. He said that the longer tanker haul from eastern Venezuelan ports to refineries at Aruba and Curacao forced concentration of production operations in the Lake fields.



Acme Photo

Italian terminal of an old pipe line where "Jerri-cans" are being filled, possibly in preparation for the leap-frog invasion below Rome

THIS WEEK

INTERNATIONAL— U. S. foreign-petroleum policy maintains highest interest in oil circles. . . . It's watched for clue to administration's attitude on domestic operations, for a hint on where industry is headed if internal supplies continue diminishment. . . . ¶Resolution calling for abolishment of Petroleum Reserve Corp., threatens to throw entire question into politics. . . . ¶PRC officials deny even slightest evidence of meddling in affairs of Harry Hopkins. . . . ¶E. DeGolyer returns from trip to Persian Gulf area, under injunction to remain silent on mission, what he saw, and what were objectives. . . . ¶Current production in Venezuela running around 650,000 bbl. daily. . . . Withdrawals proportionately higher from Lake Maracaibo region, because of greater availability of lake tankers, safer shipping lanes to Aruba and Curacao. . . . ¶World oil cooperative plan proposed, experienced oil men question feasibility. . . .

REFINING—DSC removes restrictive clause in District 2 tank-car reimbursement plan. . . . Permits all processors, whether in excess-profits bracket or not, to file claims for higher transportation costs from West Texas. . . . ¶Formal opening of industry's largest butadiene plant, at Port Neches, Tex., scheduled February 23. . . . Canol refinery at Whitehorse to be completed in May, indicating Army has decided to complete project despite Truman committee criticism. . . . ¶First fluid-catalytic cracker in the Middle West completed for Shell Oil Co., Inc., at Wood River, Ill., duplicate unit will be ready for service in few weeks.

SUPPLIES— Rate of addition to gasoline stocks falling behind forecast of 7,000,000 bbl. for month. . . . ¶Off-season declines in California emphasize critical position of Pacific Coast gasoline. . . . ¶One butadiene plant alone absorbs 25,000 bbl. daily of naphtha, part of which could be reformed to motor-fuel specifications. . . . ¶Kerosene remains critical on East Coast and in other areas. . . . ¶Concern growing over availability of gasoline for 20-in. products line. . . .

TRANSPORTATION— Lack of tank cars force reduction in purchases of crude in several Texas fields. . . . Shipments by railroads to East Coast rise to 671,737 bbl., involving 63,625 cars. . . . ¶WEP prepares to start runs from Beaumont, Tex., to Norris City, Ill., through 20-in. products system. . . . ¶Tank cars liberated by 20-in. will be diverted to move crude from District 3 to District 2 and for supplementing California products, possibly from Texas and Rocky Mountains. . . .

MATERIALS—WPB authorizes resumption of lightweight tubing production, chiefly for eastern gas wells. . . . ¶Manufacturing rate increasing weekly on tool joints, boilers, drill pipe, drilling engines and other equipment for sustaining completion rate. . . . ¶Restrictions on spacing modified in shallow wells in Cincinnati arch-Nashville dome area. . . . One well to 5 acres permitted in districts producing from 1,200 ft.; 10-acre spacing for 1,800-ft. wells.

PRICES— Industry turns to thorough study of subsidies for stimulating production and drilling. . . . OPA is drafting preliminary plan for submission to Fred Vinson, economic director. . . . Changed emphasis indicates Disney bill may rest indefinitely in Senate committee. . . .

Transportation Exerts Delicate Control Over Texas Oil Production

AUSTIN, Tex.—The delicate balance existing between crude-oil purchases, pipe-line runs and transportation was emphasized here last week when several buyers reported they would be forced to make a temporary cut in procurements from East Texas, West Texas and other fields. Obviously, some of the reductions are traceable to failure of District 2 refiners to establish regular tank-car shipments to northern refining centers as purchasers and pipe-line companies operating in the Permian basin had anticipated.

At the regular state-wide proration hearing, representatives of Humble Oil & Refining Co. announced that daily requirements in West Texas during February would be reduced 15,000 bbl. and that the company still would be compelled to store about 5,000 bbl. per day if its purchases are sustained at 110,000 bbl. daily. Humble is purchasing West Texas crude oil at the rate of 125,000 bbl. daily this month. One representative said that the WEP crude-oil program for February contemplated a reduction in runs of West Texas crude oil and that this was the major factor in scaling down his company's requirements.

Transportation shortages also forced Humble to reduce its nominations for crude oil in February by 7,000 bbl. daily in the Hawkins field and 2,500 bbl. daily in the Talco field, both in East Texas. Tank-car shortages were blamed.

Total nominations for crude reflected by commitments filed before the hearing by Texas crude-oil purchasers aggregated 2,096,972 bbl. daily in February, an increase of 6,789 bbl. over the January total. Nominations compare with the Petroleum Administration's certified demand for 2,018,000 bbl. of all petroleum liquids from Texas in February, a figure that includes estimated production of 132,000 bbl. daily of natural gasoline and condensate.

Sustained high demand for Panhandle crude oil was indicated by requests from Phillips Petroleum Co. for a minimum of 47,000 bbl. daily next month. E. H. Foster, Phillips' attorney, said his company obtained 43,000 bbl. daily in January but that sale of 100,000 bbl. during the month to Humble and daily deliveries of 1,500 bbl. to Danciger Oil & Refining Co. at Pampa forced a net decline in crude-oil stocks.

An annual review of salt-water disposal operations and physical status of the East Texas field was presented before the Railroad Commission hearing.

During the past year, the East Texas report pointed out, more oil was produced than in any other similar period in the history of the field.

Pressure Drop Arrested

On January 1, 1943, the bottom-hole pressure in the East Texas field was 1,015.71 lb. per sq. in., and on January 1, 1944, the pressure was 1,012.44 lb., a loss of only 3.27 lb. during the entire year. Production averaged 352,351 bbl. daily. These data indicate that 39,329,728 bbl. of oil were produced for each pound loss in bottom-hole pressure during 1943. Up to January 1, 1944, the East Texas field had produced a total of 1,904,795,048 bbl. of oil. The original bottom-hole pressure was 1,620 lb. per sq. in., which pressure had declined 607.56 lb. to last January 1. During the entire life of the field 3,135,155 bbl. of oil had been produced for each pound loss in pressure.

During December 1943, the East Texas field produced an average of 367,224 bbl. of oil per day and approximately 430,000 bbl. of salt water per day. However, an average of 306,811 bbl. of salt water was returned to the Woodbine sand. The reservoir pressure during December increased 5.03 lb. as a result of the net withdrawal being less than the critical volume for the field.

During December, approximately 300 wells producing in excess of 100 bbl. of water per day were shut in under the orders of the Railroad Commission and their allowables produced by other wells on the same lease. This shut-in program resulted in the nonproduction of approximately 100,000 bbl. of salt water per day.

The East Texas Salt Water Disposal Co. has announced its plans for taking care of all of the remaining water produced in the East Texas field and is installing three additional salt-water disposal systems which will add materially to its program. During December, the company injected an average of 194,965 bbl. of water per day and currently is handling in excess of 200,000 bbl. daily.

Proposed Bill Would Extend Limits of Elk Hills Reserves

WASHINGTON, D. C.—Hearings on H.R. 2596, a bill to extend the limits of Naval Petroleum Reserve 1 to include public lands within the same geologic structure as the Elk Hills area, are being held this week before the House committee on public lands.

Principal witness at the first sessions was Rear Adm. H. A. Stuart, U.S.N. (Ret.), director of the Office of Naval Petroleum Reserves, who reviewed the history of the reserve, and the Navy's various agreements with the Standard Oil Co. of California.

"The Navy's problem and national policy has been, is, and until private interests in the field are eliminated or controlled, will continue to be the prevention of drainage from Navy's land and conservation of Navy's oil in the ground," Admiral Stuart told the committee, and emphasized the importance of including all potential oil in the area adjoining Elk Hills within the Naval Petroleum Reserve.

The House bill, favored by the Navy, provides:

1. Leases, issued by the Interior Department under the General Leasing Act and covering public lands added to the reserve on October 15, 1942, by Executive Order 9257, are to terminate at the expiration of their current terms.

2. Leases, issued by Interior under the General Leasing Act and covering public lands outside the reserve but on the same known geologic structure, are to terminate at the expiration of their current terms if it

is determined by the secretary of the interior that such leases may drain the reserve. When the limits of the structure are not precisely known, no lease shall be renewed on lands within 1 mile of the reserve.

3. No leases are to be issued under the General Leasing Act covering lands outside the reserve but on the same known geologic structure, or within 1 mile of the reserve where the structure cannot be precisely determined.

4. Jurisdiction over all leases issued by Interior under the General Leasing Act and covering lands added to the reserve by Executive Order 9257 is transferred from Interior to the Navy.

A Navy bill to legalize a new contract between the Navy and Standard of California will be submitted before the House naval affairs committee, Admiral Stuart indicated.

Asphalt Institute Will Sponsor Illinois Meeting

NEW YORK.—With the cooperation of the Illinois division of highways, the Asphalt Institute is sponsoring the speaking program of a state asphalt conference, to be held in Springfield, Ill., February 23 and 24.

This conference, the first of its kind, is for the purpose of discussing with state, county, city and other highway officials, the use of asphalt not only under wartime conditions but in the postwar period.

H. B. Pullar, Chicago, vice president of the Asphalt Institute is chairman of arrangements committee.

WSA Names Rates for Bulk Shipments of Petroleum

WASHINGTON, D. C.—War Shipping Administration, at request of the petroleum supply committee for Latin America, has set rates and surcharges for bulk tanker shipments of oil and oil products from Netherlands West Indies to Cuba and Central America. The committee was said by WSA to have advised it of certain prospective full cargo movements on WSA-operated vessels and involving discharges at these ports.

Percy Chubb, assistant deputy administrator for fiscal affairs, called the quotations routine and said the rates and surcharges set are in line with the basis applicable to those areas generally. The voyage charter rates for gasoline and kerosene from Aruba or Curacao, in the Netherlands West Indies to Antilla and Puerto Manati, Cuba, was set at 24.5 cents a barrel (42 gallons), the surcharge 111 per cent. It was provided that if the vessel loads at both Aruba and Curacao, 3 cents a barrel was to be added, plus the surcharge.

Lane-Wells Celebrates Perforation of Fifty-Thousandth Oil Well

OKLAHOMA CITY, Okla.—Top officials of the Lane-Wells Co. from California were here last week for the ceremony attending the 50,000th well gun-perforation job done by the company. The ceremony took place on January 19 at the Cities Service Co. 10 Nettie Emerson in the south end of the Oklahoma City field.

This marked the third time the well had been perforated, having produced 48,000 bbl. within 1 year after the first perforating job, 52,000 bbl. within 1 year after the second perforating job, and 180,000 bbl. total in the 4½-year interval since it was originally perforated.

Lane-Wells officials are making an extensive field trip before returning to their California headquarters.

Participating in the ceremony were Walter T. Wells, chairman of the board; Mrs. R. B. McCullar, sponsor, and wife of "Luke" McCullar, division manager; Rodney S. Durkee, president, and Irl M. Spangler, division operating superintendent, all of Lane-Wells, and F. A. Lichtenheld, division engineer, Cities Service Oil Co.

Marketers Given Essential Classification for Men

WASHINGTON, D. C.—Standards to be used in designating the wholesale marketing and distribution of petroleum products as a "locally needed" activity have been issued to regional manpower directors, the War Manpower Commission announced here last week.

To be designated as engaged in a locally needed activity, the wholesale marketer or distributor of petroleum products, so far as practicable, must make joint use of transportation and storage facilities when such action will promote the delivery of the largest volume of petroleum products with least use of available equiment and manpower.

South American Conference On Liquid Fuels Postponed

MONTEVIDEO, Uruguay.—The first South American conference on liquid fuels, which was to have been held in Buenos Aires in April, has been postponed on account of conditions growing out of the war. The question of when to hold the conference will be considered by the International Permanent Council of Instituto Sudamericano del Petroleo, meeting in Montevideo April 10-13.

FOUNDED IN 1910

BY PATRICK C. BOYLE

The OIL AND GAS JOURNAL

Today and Tomorrow

THE Journal's editorial staff, aided by representatives of the industry and the war agencies, has brought together in this issue the vital data concerned with national and international petroleum operations which are directing the course of a world conflict now rapidly reaching its climax. The several analyses, covering every division of oil activities, are presented concisely and completely and their reading and careful study are recommended.

Tens of thousands of men and women from this industry are now in the armed forces. The military has drawn heavily on our technical skills and, in its operations, is also taking full advantage of the ruggedness and resourcefulness of individuals coming from an aggressive industry.

To them we pay our warmest tribute with a renewed promise that, as the Allied commands take the war to the enemy on every front, no military operation will fail because the petroleum industry has not done everything it can do to make its products available in required quantities.

Apropos of this obligation, the Journal editors, as they prepared the reviews and projections of this issue, were impressed, as never before, with the human endurance and accomplishments of those who have remained on the job during two years and several weeks of war. They have furnished the war's outstanding example of "doing more with less."

To the problems of inadequate manpower and materials and the Government's failure to permit operations which would assure full protection in crude-oil requirements, there have been added a 2-billion-dollar war-product and war-transportation program.

One of the anomalies of this emergency is that the nation's top war administrators have failed to understand that these fulfillments have their genesis in the experience and initiative of a free enterprise which established and has maintained this country's supremacy in oil.

These officials are familiar with the comparisons which show that all of the world's increase in oil production since 1938 is accounted for by the expanded output of this country. They have reports which reveal that since Pearl Harbor, crude-oil output outside this country has decreased, the decline amounting to 70 million barrels in 1943 compared to 1941. They know, or should know, that producers in this country more than made up this deficit with a 102-million-barrel increase in their output. Furthermore, practically every new petroleum product serving the military has come from the war and prewar laboratories of privately operated oil companies and now their plants. Builders, manufacturers and distributors of equipment and materials in this country have furnished the design, the supplies, and most of the key manpower for the fields and plant construction everywhere.

Yet there are those at Washington who claim to be worried as to whether this nation's petroleum industry can take care of itself in the future. They are urging government participation in oil operations outside this country. Some have similar plans in regard to domestic operations.

They are urging a huge storage program in preparation for the next war which, if carried out, will prove to be a Frankenstein, of more assistance to possible enemies than it will ever be to the permanent defenses here. Meddling by government as a partner in the oil exploration and exploitation of

other countries will mark the beginning of the end of our dominance in world petroleum and is fraught with those international complications which inevitably lead to war.

The guarantee of adequate petroleum in peace and in the emergencies of the future is the same now as in the past. It has always been possible to view with alarm the outlook for future oil. No one could prove that the views were wrong and yet they always have been.

Protection lies in fostering those qualities of initiative and attainment found only in free peoples governed by democratic principles which have given our nationals control of most of the world petroleum. Those who have remained at home have demonstrated what they can do with old and new tools and new arts. Add to their efforts the technical abilities of those who will return from the armed forces and end the bureaucratic controls, and the oil business of the United States has what will be required to solve the oil problems of the future in much the same manner that they have been solved in the past. This assumes governmental support under international agreements for our nationals who, in recent years, have found most of the petroleum now available in foreign areas.

Governmental agencies and PIWC have projected 1944 petroleum demands from producers, refiners and importers in this country totaling at least 1,800 million barrels. The 10 per cent expansion over the record-breaking total of 1943 consists of war products and must be supplied in full.

Improved conditions in ocean transportation assure that other countries can be drawn upon for larger supplies than during any period since the war began. But investigators are in agreement that most of the burden of supplying Allied increases will continue in this country.

Any oil problem can be solved here more quickly than in any other place. Other areas are more restricted as to available refining capacity, and transportation difficulties increase when foreign supplies are used. Thus, what happens in Allied oil supplies in 1944 is largely dependent on what happens here. The implications of this responsibility are known to every producer and should be to every governmental administrator.

The basic weakness lies in the failure to find new oil in sufficient quantities. Last year failed in every test. The new oil discovered was less than in 1942, while production greatly increased. New discoveries represented about 50 per cent of the oil consumed. Reserves, per new field discovered and per wildcat well, continued to decline.

The year, from the reserve viewpoint, was more disastrous than the bare figures indicate. The decline in additional reserves represented by extensions to existing fields is as noteworthy as the contraction in new fields.

Successful operators are accustomed to maintain a sizable backlog of partially developed properties. This is their assurance that they will be in business 5, 15 and 50 years from now. Flush oil from the extensions finances the more hazardous efforts to find new fields. The fact that in the past the industry has had these backlogs of partially developed properties explains why there has always been sufficient oil and why products have been cheap.

The decline in extension reserves strikes at the heart of all exploration efforts and the productivity of existing fields. An industry without them in sufficient quantities is being liquidated at its source.

Those responsible for the Washington war administration must accept full responsibility for this increasingly serious situation. They have insisted on considering the search for new oil and the month-to-month production a disjointed operation in which the parts could be separated from the whole. They are urging subsidies for what appears to them to be the weak parts and at the same time are continuing to hamstring the main operations from which most of this country's oil has come and will continue to come.

What is needed now is the ending of unwarranted restrictions in operations extending from the initial exploratory efforts to the completed well. General price increases from the prewar levels are mandatory in order to assure that every force and every facility of the oil country are drawn upon to find new oil. Past history leaves no doubt as to the success of an all-out wildcat campaign once such a campaign is under way.

Further delay, as the industry's representatives have explained, points to serious shortages during the last half of this year, with Allied success in a prolonged war hanging in the balance. Failure to act today in view of these certainties of tomorrow leaves the responsible Washington officials open to grave criticism.

Minimum Wage Rates Established In Oil and Chemical Industries

NEW YORK.—A minimum wage rate of 40 cents an hour is established for the oil, chemical, coal products and allied manufacturing industries by an order, effective February 7, issued by the wage and hour division of United States Department of Labor. The action is based upon a recommendation of a committee appointed by the wage and hour division to investigate conditions. This committee was composed of nine persons representing the public, nine representing employers in the industries effected, and nine representing employes.

The industries to which the order applies are defined as follows:

"The manufacture or packaging of basic chemicals, chemical products, and products made from petroleum, coal or natural gases. It includes, but without limitation, heavy, industrial, and fine chemicals; plastics; explosives and pyrotechnics; rayon and other synthetic fibers; wood distillation and naval stores; fertilizers; soap and glycerin; candles; glue and gelatin; essential oils; nitrated, sulfonated and similarly processed oils; paints; varnishes, pigments, dyes, and printing ink; drug grinding; insecticides and fungicides; manufactured gases; petroleum refining; coke and coke-oven products; asphalt and tar paving and building materials; and allied products.

"Provided, however, that the definition shall not include: (1) Wood preserving, and any mining, quarrying or other extractive operations. (2) The rendering and refining of marine and animal fats and oils. (3) Any operations of a public utility. (4) Any product included in the metal, plastics, machinery, instrument, and allied industries (as defined in Administrative Order No. 173) or in the drug, medicine, and toilet-preparations industry, the converted paper products industry, the cottonseed and peanut-crushing industry, or the vegetable fats and oils industry as defined in the wage orders for such industries; or in any other industry for which the Administrator has already issued a wage order or appointed an industry committee."

The definition of the chemical, petroleum and coal products, and allied manufacturing industries covers all occupations in the industry which are necessary to the production of the articles covered by the definition, including clerical, maintenance, shipping and selling occupations; provided, however, that the definition does not cover (a) such clerical, maintenance, shipping and selling occupations when carried on in a wholesaling or selling department, physically segregated from other departments of an establishment, the greater part of the sales of which wholesaling or selling department are sales of articles which are resold in the form in which purchased, and (b) employes engaged exclusively in clerical, maintenance, selling or shipping operations on articles purchased for resale in the form in which purchased; and provided further, that where an employe covered by this definition is employed during the same workweek at two or more different minimum rates of pay, he shall be paid the highest of such rates for such workweek unless records concerning his employment are kept by his employer in accordance with applicable regulations of the wage and hour division.

WPB Permits Manufacture of Light-Weight Tubing

WASHINGTON, D. C.—Resumption of manufacture of light-weight tubing, used largely by gas-well operators in the eastern area, is permitted under an order issued last week by War Production Board. Large quantities of this tubing were used before its fabrication was forbidden in April 1943. Needs of eastern operators warrant fabricating it, WPB said, and its production is expected to contribute to economies in steel production owing to the lighter weight achieved by new specifications, which follow:

ADDITIONAL PERMITTED SIZES OF CASING AND TUBING

Casing, Seamless and Electric Weld, Grade J-55

Size, outside diameter (in.)	Wall thickness (in.)	Nominal weight per foot (lb.)
8⅝	.264	24.00

Standard Tubing (Nonupset) Seamless and Electric Weld, Grades F-25, H-40, J-55 and H-80

Nominal size	Outside diameter (in.)	Wall thickness (in.)	Nominal weight per foot (lb.)
2	2.375	.167	4.00
3	3.500	.216	7.70

Lap-Weld Casing

Size, outside diameter (in.)	Wall thickness (in.)	Nominal weight per foot (lb.)
5½	.304	17.00
6⅝	.186	13.00
7	.272	20.00
8⅝	.304	28.00
10¾	.307	35.75

Standard Lap-Weld Tubing (Nonupset)

Nominal size	Outside diameter (in.)	Wall thickness (in.)	Nominal weight per foot (lb.)
2	2.375	.167	4.00
3	3.500	.216	7.70
4	4.500	.237	11.00

Sizes in all cases apply only to short-thread casing and to standard nonupset tubing. In all respects other than wall thickness, weight per foot, and threading practice, such casing and tubing shall conform to the requirements of American Petroleum Institute specifications.

Plant Supplies Butadiene For 11,000,000 Tires

Enough butadiene for the manufacture of 11,000,000 automobile tires yearly is being produced by Phillips Petroleum Co. at its new Plains, Tex., plant from the greatest natural-gas field ever discovered, according to a booklet, "Phillips and Synthetic Rubber," just issued by the company in reviewing its war operations.

"Thirty million synthetic rubber trees started producing on a few acres of Texas cattle country when Plains butadiene plant began operations a few miles west of Borger in the Texas Panhandle," the booklet says. "About 10 per cent of all butadiene made from petroleum will be supplied by this newest and one of the largest plants in the nation's program for rubber self-sufficiency."

Speaking of the broader field of general hydrocarbon development, the booklet states Phillips has acquired enormous reserves of hydrocarbons, many different kinds of which are readily available to the company and may be used for making butadiene and synthetic rubbers. The company's present known reserves of raw materials within reach of the Plains plant alone are conservatively estimated sufficient to last 35 years at the current rate of consumption.

East Coast Supply Outlook Unimproved

WASHINGTON, D. C.—A severe strain on the East Coast oil supply system has been created by reorganization of facilities in anticipation of fitting the 20-in. products line into the general facilities and diverting tank cars to other runs.

"For many reasons—and military requirements are the most important cause—transportation to the East Coast has again become a problem of great magnitude," Petroleum Administrator Harold L. Ickes said here last week.

"Fortunately, stocks of all products on the East Coast are adequate at the moment to meet the rationed civilian demand, and we are still hopeful that they will continue so."

Deputy Administrator Ralph K. Davies stated that tank-car deliveries to the East Coast during the week ended January 15 averaged 671,737 bbl. daily, an increase of 16,789 bbl. daily over the previous week's deliveries. Actual counts showed that 63,625 tank cars are now engaged in East Coast service.

"The tank-car problem is a serious one," Mr. Davies explained. "We are informed by the Office of Defense Transportation that the shortage of personnel to handle the tank cars and the huge volume of other railroad traffic are making it difficult to keep up with the strenuous pace called for in our supply program."

The PAW deputy administrator said that because of wartime shortages common to all forms of rubber-borne transportation, the currently available supply of tank-truck equipment is not adequate to meet fully the demands for the movement of petroleum products, particularly in distribution from East Coast supply terminals to local storage points. The inadequacy of tank-truck facilities already has been in large measure responsible for several brief local shortages in the Southeast. These inadequacies also affect tank-car operations because in many phases trucks must be replaced with tank cars from long-distance service.

Barnsdall May Enter Active Operations in Venezuela

NEW YORK.—D. R. Snow, vice president of Barnsdall Oil Co., Tulsa, and Carl Richardson, of the company's Houston, Tex., office, are in Venezuela investigating conditions with a view to the possibility of the company's entrance into active oil operations in that country. Barnsdall hitherto has confined its operations to the United States.

James A. Dunn, president of the company, New York, said the officials now in Venezuela were expected to make a full report next month. "If possible, they will return with concession material already prepared," Dunn said. "If it is possible to begin oil production immediately we will be glad to do so. We have been impressed with the oil possibilities of Venezuela for some time and anticipate a favorable report."

ANNUAL SECTION

STARTS ON NEXT PAGE

World-Wide Oil Cooperative Proposed for Postwar Period

WASHINGTON, D. C. — A world-wide nonprofit petroleum organization with wells, refineries and a tanker fleet was outlined here last week to a conference on International Cooperative Reconstruction by Howard A. Cowden, president of the Consumers Cooperative Association of North Kansas City, Mo.

He saw the movement as a $12,000,000 project, with "almost limitless" possibilities. Cooperatives, he said, would advance two-thirds of the original capital, the remaining third to be borrowed. He suggested that some of the money might be borrowed from the Petroleum Reserves Corp.

Cowden suggested Texas as the location for the internationally owned refinery, but added that a world survey might develop a better site in Mexico, Colombia, or Venezuela, or elsewhere.

The proposal was made at a 2-day conference, attended by representatives of 20 nations. The conference considered plans to make existing cooperative distributive machinery available to UNRRA.

DEATHS

Albert Young, 32, of Goose Creek, Tex., died January 16 of burns suffered the day before in an explosion at the Baytown, Tex., Ordnance Works of Humble Oil & Refining Co.

T. C. Stockton, 55, a driller, died January 17 of pneumonia at his home in Electra, Tex.

C. J. Shortess, 70, vice president and general manager of the Colorado-Wyoming Gas Co., died January 17 at Wichita, Kans., from a heart attack. He was born in Joplin, Mo., and was associated with the Cities Service Co. in Texas, Missouri, Kansas and Colorado for 30 years.

Capt. Earl C. Perry, formerly scout for Sinclair Prairie Oil Co. in Midland, Tex., died January 2 of injuries suffered in the Asiatic theater of war. He was a pilot in the Army Transport Command.

Stephen E. Stone, 84, retired South Penn Oil Co. employe, died January 12 in Franklin, Pa.

Archie F. Finley, 39, accountant for Navarro Oil Co., Houston, Tex., died January 19.

John M. Carden, 43, for years engaged in the oil business with his father, David A. Carden, died January 19 at his home in Houston, Tex.

Robert Burr, refinery superintendent for Elk Refining Co., Charleston, W. Va., died January 15 of a heart attack.

Charles A. Trobaugh, 50, for 11 years an employe of Humble Oil & Refining Co., died January 20, in Sugar Land, Tex., where he resided.

M. P. Dikeman, independent oil distributor in Temple, Tex., died January 21 of burns suffered a short time before when he was trapped inside a storage room where he was delivering kerosene. An explosion was followed by fire.

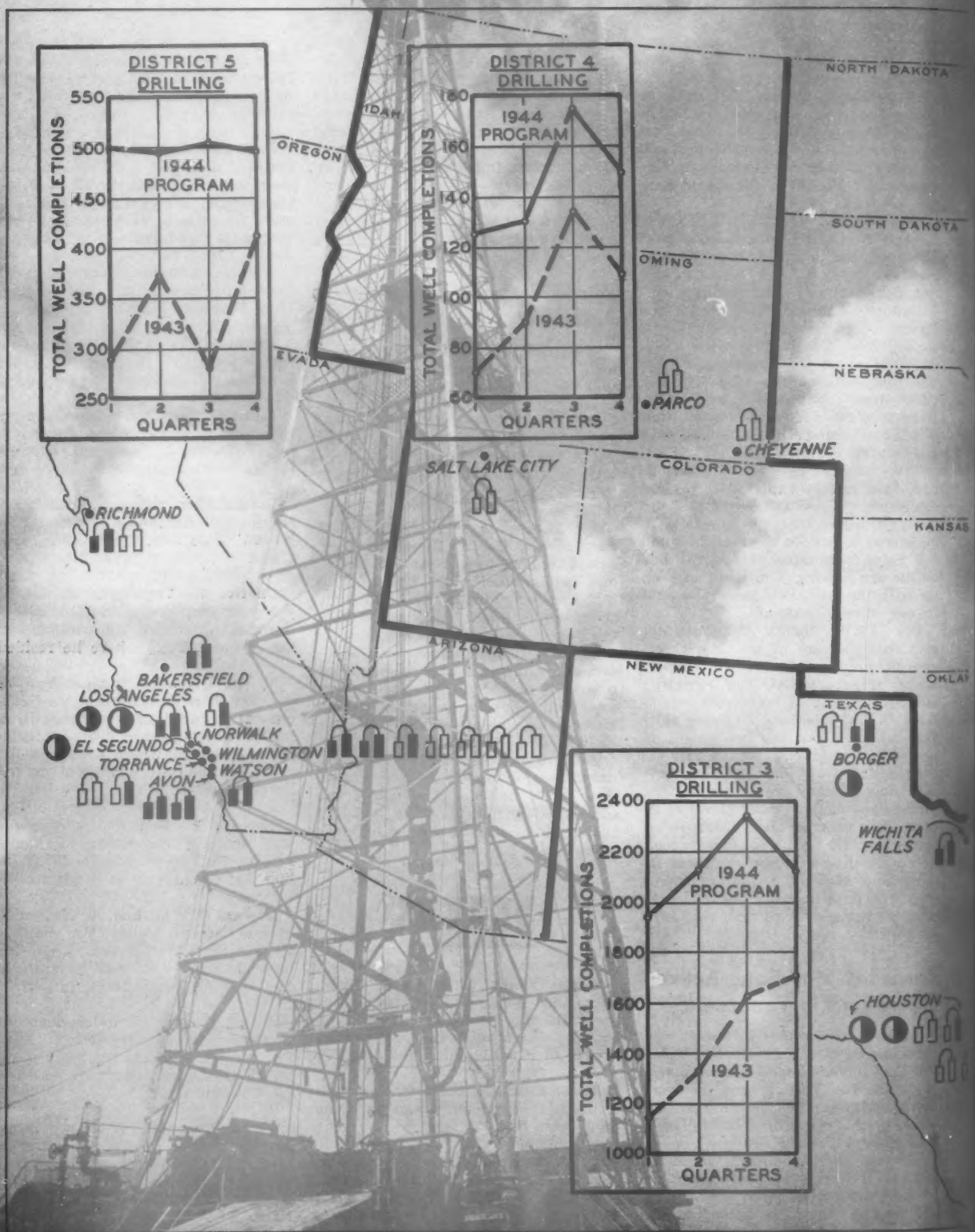
Thomas W. Bell, 93, veteran oil-well drilling contractor of Mount Jewett, Pa., died January 16 at the home of a daughter in Bradford, Pa.

Howard O. Whittling, 70, accountant at the Farmers Valley, Pa., plant of Quaker State Oil Co. until his retirement 5 years ago, died recently at the home of a sister in Buffalo, N. Y.

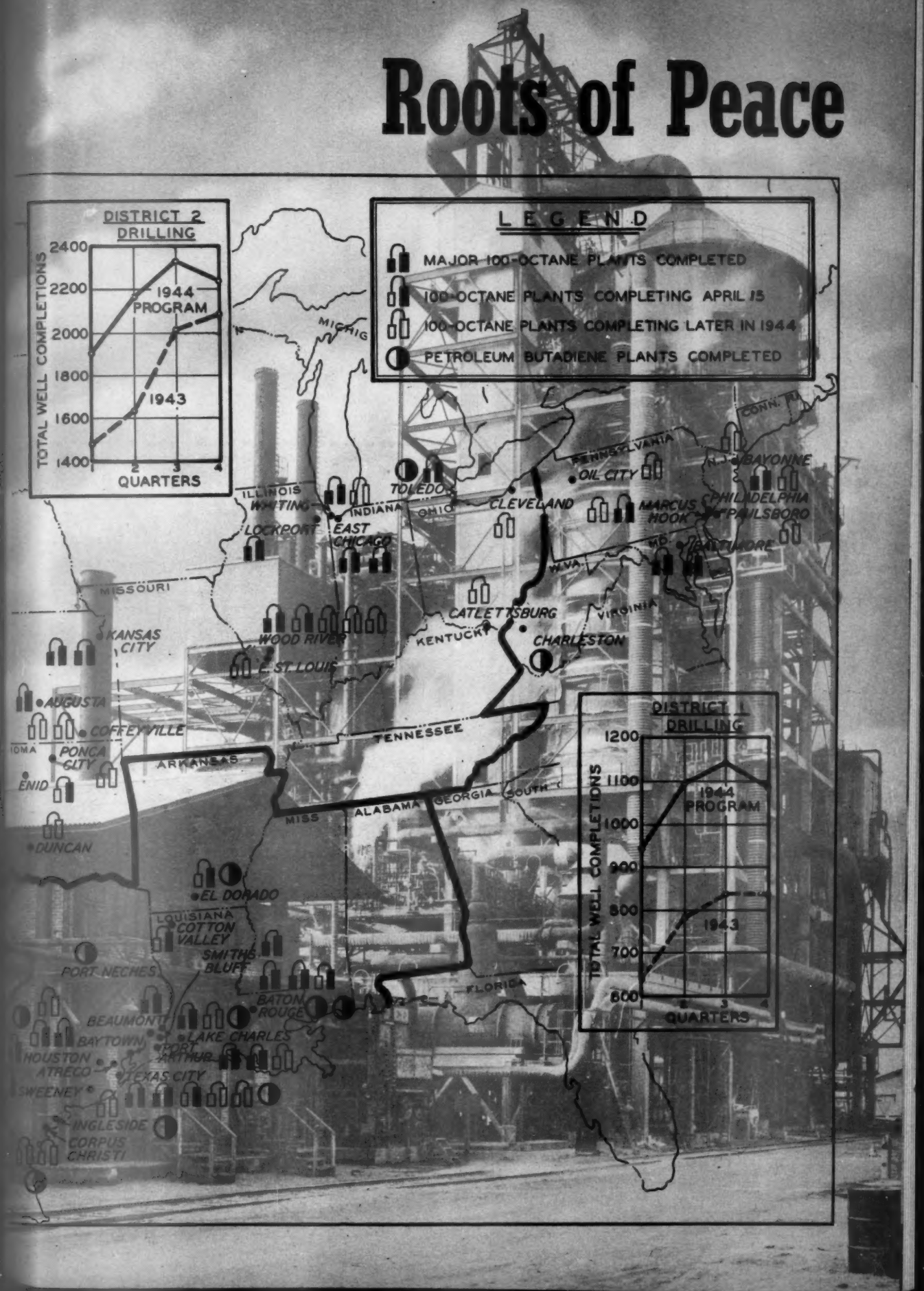
Alfred Groser, 84, independent oil producer, died January 10 in Oil City, Pa. For years he and his brother, the late F. E. Groser, operated leases in the Oil City area.

Virgil Shappell, Winfield, Kans., oil-field worker, died January 12 from injuries suffered a short time before in an explosion at a well in the Rahn pool, 12 miles east of Arkansas City, Kans.

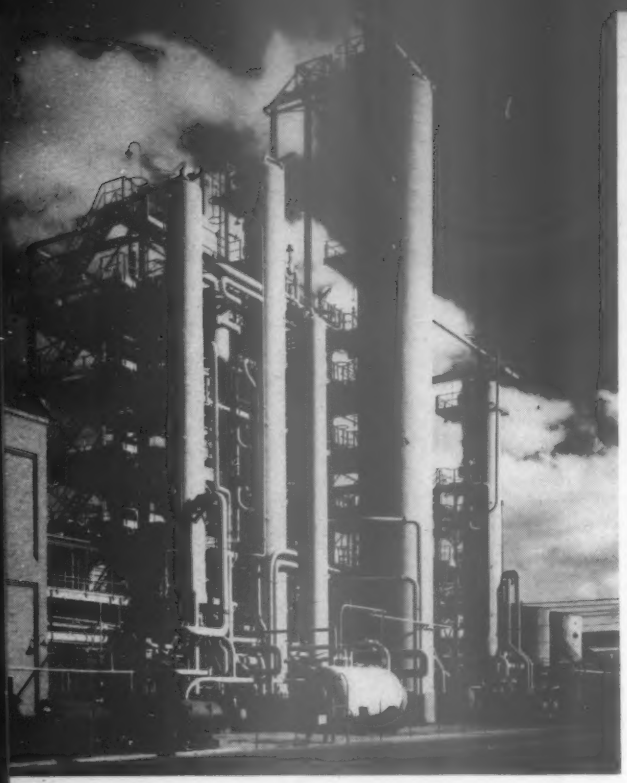
Sinews of War



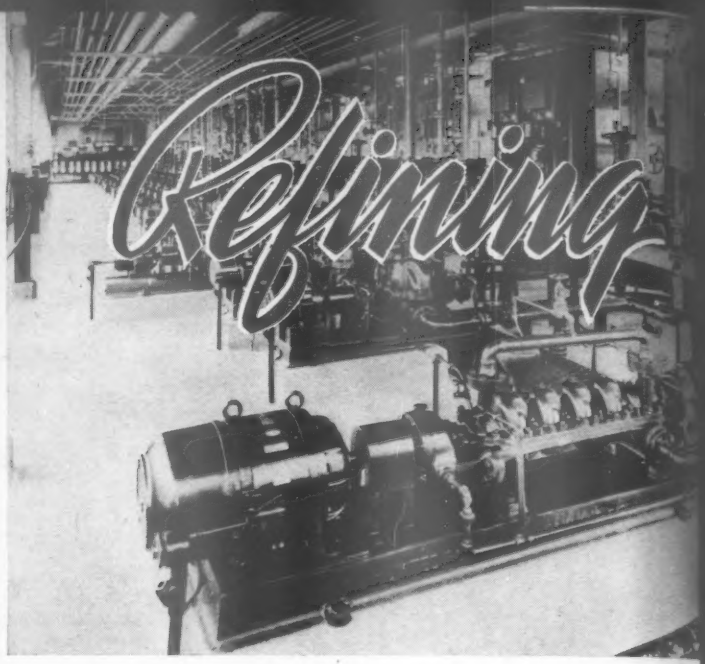
Roots of Peace



Refining

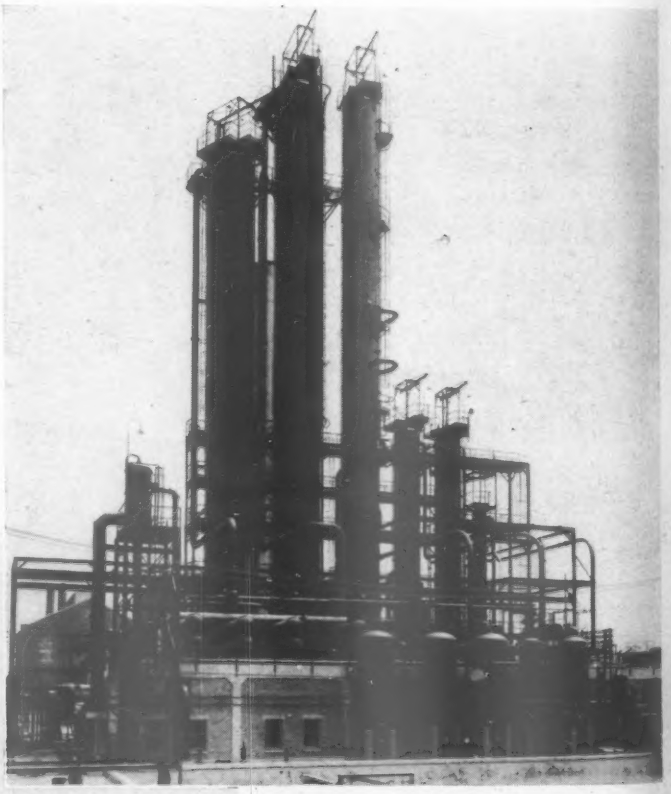


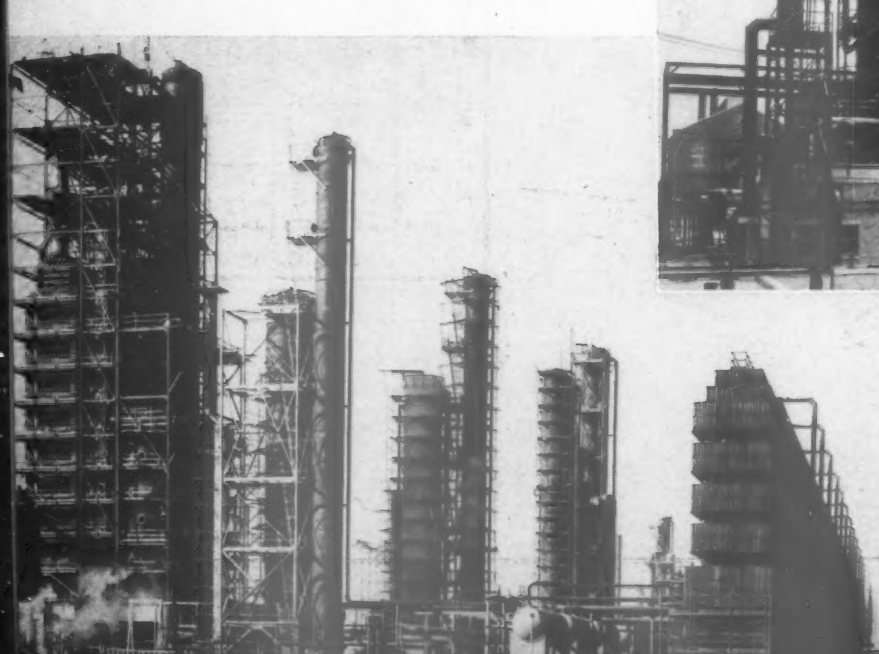
Alkylation unit of Magnolia Petroleum Co. refinery at Beaumont, Tex. The unit is designed for a capacity of about 4,000 bbl. per stream day of aviation alkylate



Pump house of Shell Oil Co., Inc.'s butadiene plant at Houston Tex., which was the first plant built to produce this product commercially

ON these pages are shown eight representative war-production plants in operation or nearing completion at refineries in the United States. By the end of this year plants producing aviation gasolines, butadiene and toluene will represent expenditures of approximately 1½ billion dollars. More than 160 refineries are engaged in the production of 100-octane components with 90 major units under construction or now operating. Sixty-six per cent of the projected production of 690,000 short tons of butadiene yearly will be manufactured from petroleum. All of the 450 refineries and more than 600 natural-gasoline plants in the nation are being operated to give maximum support to the war effort.

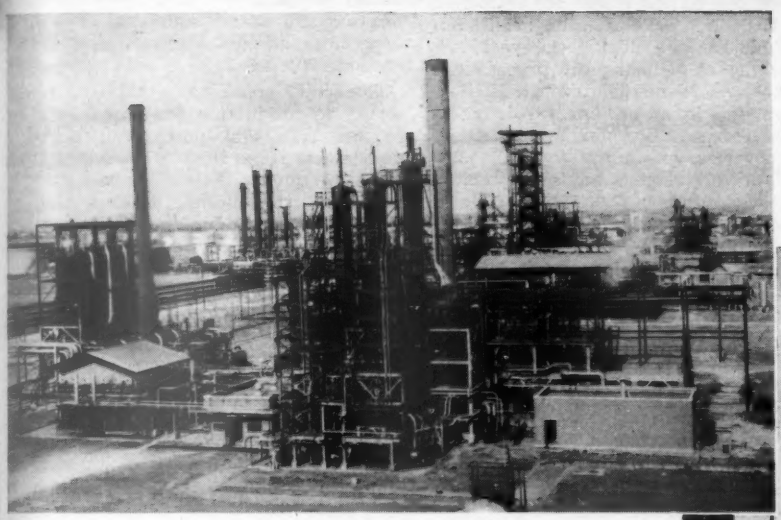




Above: Toluene unit at Gulf Oil Corp.'s refinery at Philadelphia, Pa. This plant has been in operation for several months

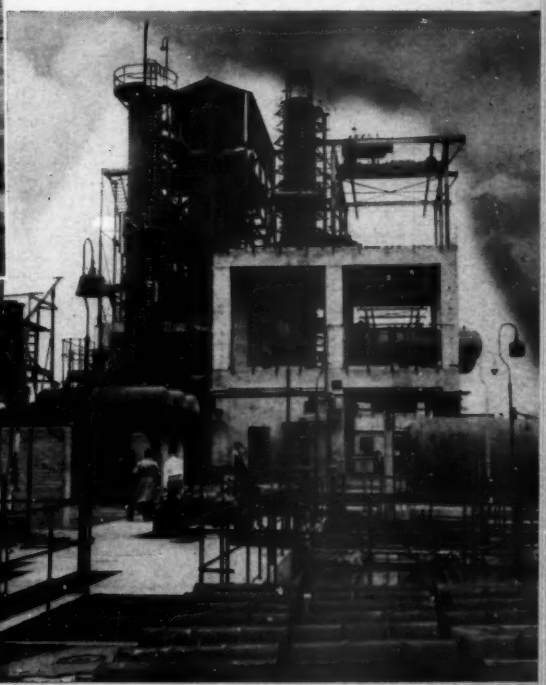
Left: T.C.C. units 1 and 2 of General Petroleum Co. of California at Torrance, during construction operations. Alkylation unit and gas plant at right

ON THE MARCH!



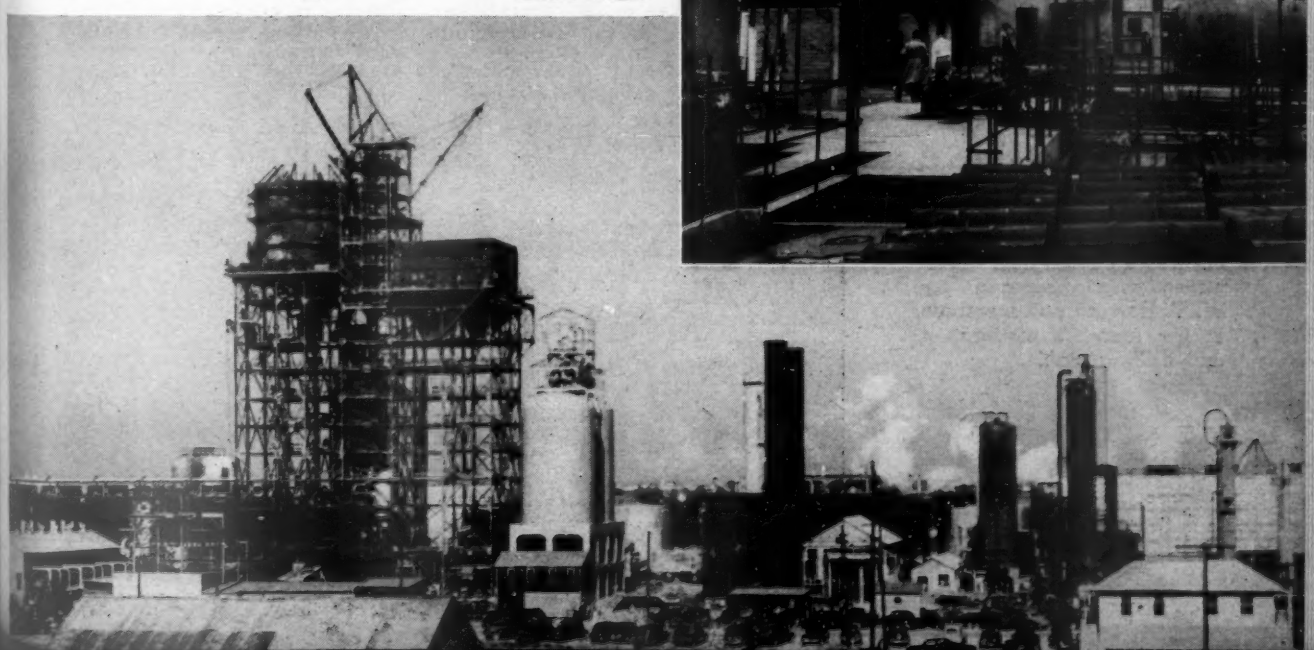
Above: Four-case Houdry catalytic-cracking unit of Socony-Vacuum Oil Co., Inc., at East Chicago, Ill. Production is over ?,000 bbl. per day of aviation-gasoline base stock

Below: General view of catalytic reactors and auxiliary equipment in Union Oil Co. of California's new isomerization unit at Los Angeles

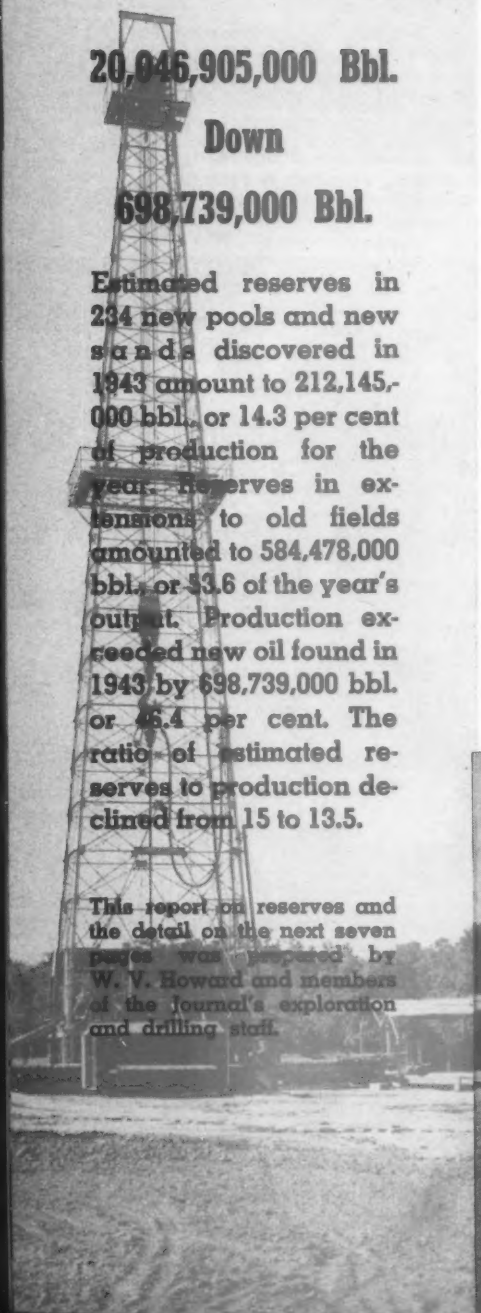


Above: General view of Pan American Refining Corp.'s polymerization plant at Texas City, Tex.

Below: Fluid catalytic-cracking unit for 100-octane gasoline at Republic Oil Refining Co.'s plant at Texas City, Tex. View shows plant under construction



Proven Reserves



20,046,905,000 Bbl.

Down

698,739,000 Bbl.

Estimated reserves in 234 new pools and new sands discovered in 1943 amount to 212,145,000 bbl., or 14.3 per cent of production for the year. Reserves in extensions to old fields amounted to 584,478,000 bbl., or 53.6 of the year's output. Production exceeded new oil found in 1943 by 698,739,000 bbl. or 46.4 per cent. The ratio of estimated reserves to production declined from 15 to 13.5.

This report on reserves and the detail on the next seven pages was prepared by W. V. Howard and members of the Journal's exploration and drilling staff.

PROVEN reserves in the oil fields of the United States are estimated at 20,046,905,000 bbl., a net decline of 698,739,000 bbl. during the year. As was the case during the preceding 5 years, oil found in new pools, new pays and in extensions to old pools was less than the year's production. Discoveries amounting to 212,145,000 bbl. and extensions having estimated reserves of 584,487,000 bbl. gave a total of 796,632,000 bbl. of new oil found during the year. This is 44,756,000 bbl. less than last year's total of 841,388,000 bbl. of new oil found.

Practically 70 per cent of the new oil found is in two states, Wyoming and Texas, the former state leading all others with a total of 311,980,000 bbl., the great bulk of which is in the Elk Basin field.

Only two states produced less than was found in 1943, namely, Wyoming and Kentucky, a record which nearly parallels that of 1942 when three states, Colorado, Arkansas and New Mexico, showed a gain. Principal losers were Texas and California with net declines of 346,398,000 bbl. and 220,386,000 bbl., respectively.

Not only were reserves in new pools lower than ever, but the average size of the discoveries was also at an all-time low. Last year the 234 new pools and pays opened up had an average estimated reserve of 907,000 bbl. compared with an average of 1,480,000 bbl. in 1942.

Ratio of Reserves to Production

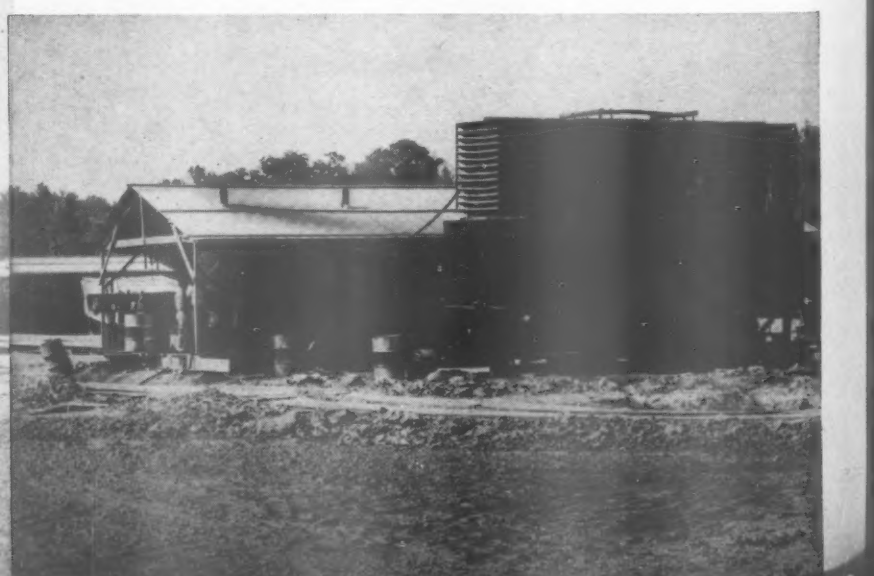
The reserve estimates presented indicate only a part of the picture. That reserves have declined 3.3 per cent in a year is in itself not an alarming conclusion. Taken in conjunction, however, with an increase in production of 107,944,000 bbl. over 1942, the deficiency of discoveries amounted to 2,238,057,000 bbl., or 11 per cent of the total reserves. The ratio of reserves to production has fallen from 15 to 13.5 in a single year, which may be considered equivalent to using up 18 months' supply in 12 months.

The increased production of 1943, combined with failure of the exploration program to find new fields, has carried every state but Texas, Wyoming and New Mexico below the national average.

Generally speaking, a ratio of reserves to production for any district of less than 10:0 indicates that the district has some flush areas which it is overproducing. This is the case with Louisiana, Oklahoma, Kansas, Nebraska, Illinois, Indiana, Kentucky and Michigan. A rising ratio in these states suggests that the condition of overproduction is curing itself by the passage of these flush areas into the stripper stage. This is, of course, modified by the discovery of new areas which, in turn, may be overproduced.

With the exception of Kansas and Kentucky, production in all of these states was less in 1943 than in 1942 and Kansas has found itself unable to maintain a daily average production of around 300,000 bbl. established in the middle of the year. Production from all of these states may be expected to show continued declines.

A ratio of reserves to production of around 10:0 indicates that the district involved is either in the stripper stage or is holding some flush production at low levels. Of the states in



this category, the eastern states are in the stripper stage, with production slowly declining. There is almost unanimous opinion to the effect that California will be unable to maintain its present rate of production for long.

Thus, since national production is expected to increase again in 1944, and production throughout most of the Mid-Continent, California and the states east of the Mississippi River is expected to decline, the burden of meeting this increased demand must fall on a few states, namely Texas, Arkansas and the Rocky Mountain states. These states have already been called on to produce more additional oil than the national increase in 1943. In fact, Texas alone made up practically all of the increase. Just to hold the nation's production at present levels, these states will probably be called on to produce 80,000,000 bbl. more in 1944 than they did in 1943 and if there is a further increase, that will have to come from these areas also.

In Texas, the East Texas district is producing almost to capacity, despite a large reserve - to - production ratio owing to water conditions in the large East Texas field. The Gulf Coast area could produce some additional oil but the great bulk of any increase will have to come from the Permian basin and Wyoming. In other words, it will be heavy oil, much of it high in sulfur, and all of it undesirable from the standpoint of high yields of aviation gasoline.

Prospects for 1944

Discoveries are needed immediately and prospects that they will be made do not appear too good. The only new area that has come into the production picture in Florida, where the discovery well is now testing.

Deep Ellenburger production in West Texas is also an interesting possibility as the oil is of better grade than that found in the Permian pays. The cost of drilling these deep wells is very high and encouragement in the form of a price increase is urgently needed before the deep pays will find much activity.

The Rocky Mountain basins are definitely in the list of major prospects but here the chances are far better for the same heavy crude as already has been found in abundance than for lighter and better oil.

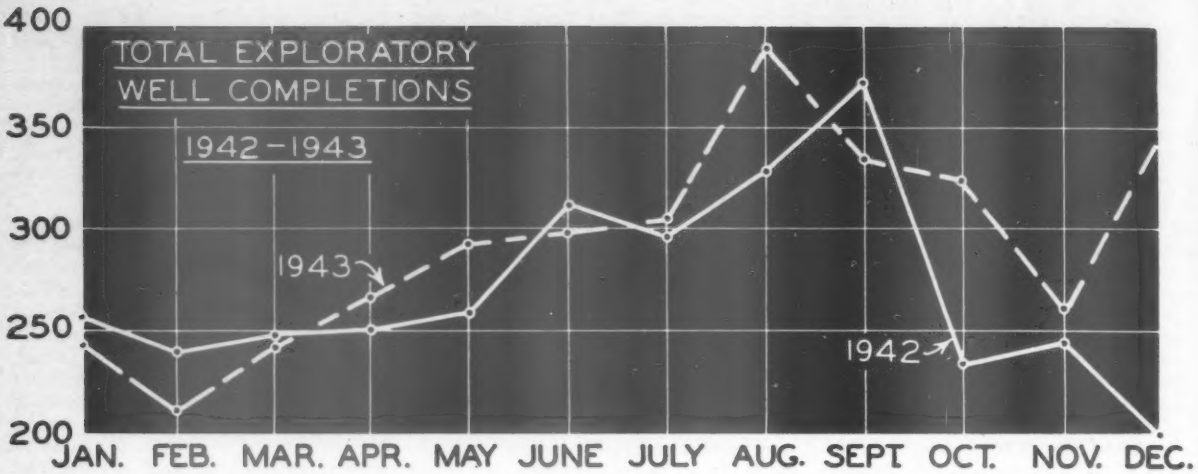
In the Mid-Continent area, the best chances appear to be in the Anadarko basin, particularly to the west of the Nemaha ridge. Already new pools have been opened west of Edmond and Moore on a trend paralleling the main ridge. Great interest is being shown in wells soon to be completed in a second parallel trend. Operators believe these areas to be of major importance and drilling is expected to be energetically pushed during the coming year.

Areas considered to have the best chances in 1944 are the deep West Texas fields, the Wyoming basins and the rim of the Anadarko basin in western Oklahoma.

PROVEN OIL RESERVES JANUARY 1, 1944

(In thousands of barrels)

	Estimated reserves as of Jan. 1, 1943 (revised)	1943 Discoveries	1943 Extensions	Total	Less 1943 production	Estimated reserves as of Jan. 1, 1944	Gain or loss (—)	Ratio Reserves Jan. 1, 1943	Ratio Production Jan. 1, 1944	Per cent Jan. 1, 1944
California	3,200,468	12,700	51,200	3,264,368	284,286	2,980,082	—220,386	12.9	10.5	14.9
Southern	1,004,737	.....	100	1,005,847	110,644	895,203	—110,544	9.2	8.1	4.5
Coastal	461,189	200	32,500	493,879	40,539	453,340	—7,839	13.5	11.2	2.3
Northern	1,734,542	12,500	18,600	1,764,642	133,103	1,631,539	—102,003	16.5	12.3	8.1
Montana	109,698	120	1,140	110,958	7,641	103,317	—6,381	13.7	13.5	0.5
Wyoming	340,329	13,680	298,300	652,309	34,766	617,543	277,214	10.4	17.8	3.1
Colorado, Utah	31,978	.....	1,232	33,210	2,431	30,779	—1,199	13.9	12.7	0.2
New Mexico	606,673	300	14,000	620,973	38,924	582,049	—24,624	18.4	15.0	2.9
Texas	11,692,408	70,195	172,545	11,935,148	589,129	11,346,019	—346,389	24.6	19.6	56.7
Panhandle	633,355	.....	.....	633,355	33,700	599,655	—33,700	20.4	17.8	3.0
West	2,785,576	3,940	116,350	2,905,866	98,637	2,807,229	21,653	34.5	28.5	14.0
North	544,186	26,290	21,050	592,526	41,275	551,251	6,065	13.3	13.3	2.8
West Central	90,797	1,580	10,290	102,665	8,453	94,212	3,417	10.5	11.1	0.5
East	3,448,609	8,230	20,500	3,477,339	172,542	3,304,797	—143,812	22.7	20.4	16.6
South	306,647	5,895	480	313,022	23,173	289,849	—15,798	15.5	12.5	1.4
South Centralia	69,345	300	200	69,845	6,407	63,438	—5,897	13.0	9.9	0.3
Lower Gulf	968,666	12,330	700	980,696	53,574	927,122	—41,544	27.5	17.3	4.6
Upper Gulf	2,845,199	11,660	2,975	2,859,834	151,368	2,708,466	—136,733	28.1	17.9	13.5
Louisiana	1,183,497	12,780	2,915	1,199,192	125,780	1,073,412	—110,085	9.2	8.5	5.4
Gulf Coast	893,417	12,780	1,515	907,812	95,541	812,171	—81,246	9.4	8.5	4.1
North	290,080	.....	1,400	291,480	30,239	261,241	—28,839	8.9	8.6	1.3
Arkansas	392,907	500	1,500	394,907	27,606	367,301	—25,606	14.7	13.3	1.8
Mississippi	63,381	3,700	.....	67,081	18,868	48,213	—15,168	2.3	2.5	0.2
Oklahoma	1,194,345	35,075	320	1,229,740	120,559	1,109,181	—85,164	8.0	9.2	5.5
Kansas	974,272	33,135	3,435	1,010,842	105,697	905,145	—69,127	10.1	8.6	4.5
Nebraska, Missouri	2,795	.....	.....	2,795	854	1,941	—854	2.0	2.4	0.0
Illinois	457,652	15,060	20,060	492,772	77,637	415,135	—42,517	4.3	5.3	2.1
Indiana	32,639	4,400	.....	37,039	5,343	31,696	—943	3.7	5.9	0.2
Kentucky, Tennessee	42,313	3,500	8,000	53,813	7,908	45,905	3,592	9.1	5.8	0.3
Michigan	100,003	7,000	8,300	115,303	20,535	94,768	—5,235	4.9	4.6	0.5
Ohio	34,848	.....	1,540	36,388	3,185	33,203	—1,645	10.3	10.4	0.2
West Virginia	37,128	.....	.....	37,128	3,158	33,970	—3,158	10.6	10.8	0.2
Pennsylvania	198,273	.....	.....	198,273	16,751	181,522	—16,751	11.8	10.8	0.9
New York	50,037	.....	.....	50,037	4,313	45,724	—4,313	10.1	10.6	0.2
Total United States	20,745,644	212,145	584,487	21,542,276	1,495,371	20,046,905	—698,739	15.0	13.5	..



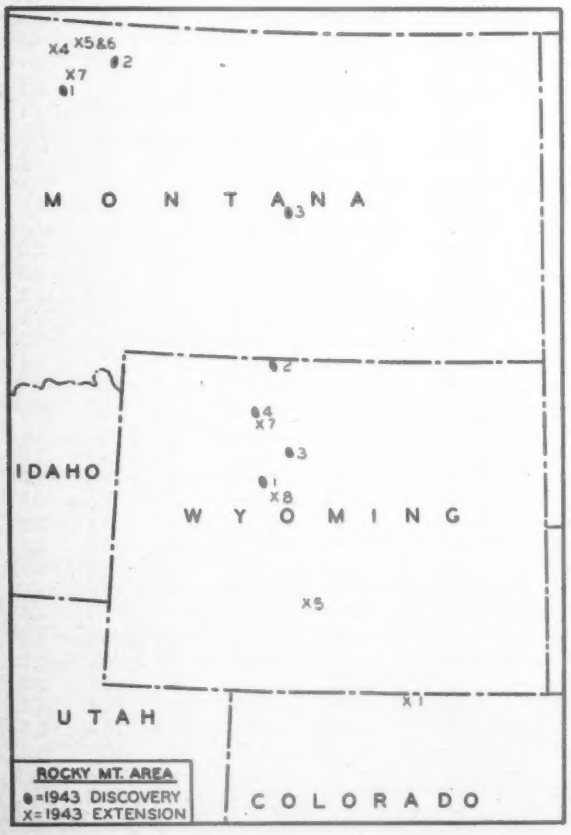
Last year's record of new discoveries was made all the more discouraging by the increase in exploratory well completions charted on the basis of reports to the Petroleum Administration for War

Discoveries and Extensions by Districts

COLORADO

Extensions

Field and county; producing formation—	Acreage proven (ac.)	Formation thickness (ft.)	Estimated reserves (thou. bbl.)
(1) North McCallum, Jackson; Frontier	60	150	1,200
Miscellaneous	...	.....	32
Total			1,232



WYOMING

Discoveries

Field and county; producing formation—	Acreage proven (ac.)	Formation thickness (ft.)	Estimated reserves (thou. bbl.)
(1) Steamboat Butte, Fremont; Sundance	480	26	7,200
(2) Frannie, Park; Madison	40	46	200
(3) Gebo, Hot Springs; Embar	160	107	4,800
(4) Oregon Basin, Park; Madison	120	146	1,200
Miscellaneous	...	.....	280
Total			13,680

Extensions

(5) Elk Basin, Park; Tensleep	5,000	200	275,000
(6) Lost Soldier, Sweetwater; Tensleep	100	360	500
(7) Oregon Basin, Park; Embar	800	41	9,600
(8) Pilot Butte, Fremont; Tensleep	80	40	200
Total			285,300

MONTANA

Discoveries

(1) Brady, Pondera; Sunburst	40	32	40
(2) East Utopia, Liberty; Ellis-Madison	40	2	40
(3) Gage, Musselshell; Amsden	40	35	40
Total			120

Extensions

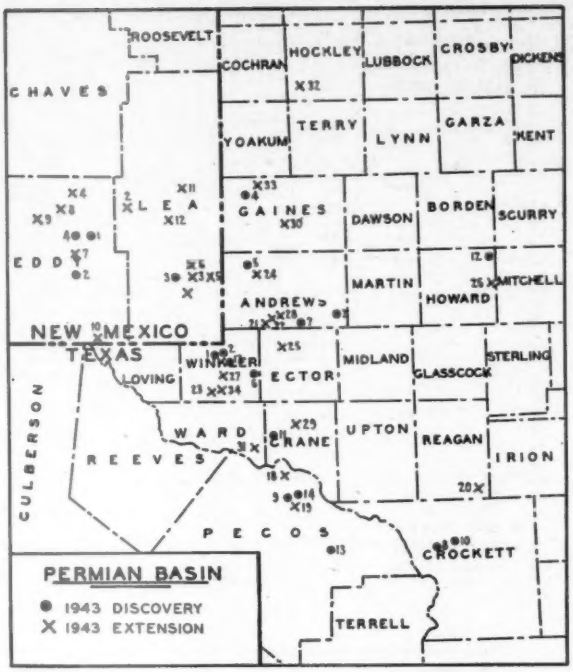
(4) Cut Bank, Glacier; Cut Bank	240	70	600
(5) Kevin-Sunburst, Toole; Madison	160	4	240
(6) Kevin-Sunburst, Toole; Ellis-Madison	40	7	60
(7) Midway, Pondera; Sunburst	160	29	240
Total			1,140

WEST TEXAS

Discoveries

(1) Kermit-Ellenburger, Winkler; Ellenburger	40	27	400
(2) Keystone-Ellenburger, Winkler; Ellenburger	40	60	400
(3) Mabee, Andrews;	160	20	980
(4) Russell, Gaines; Clear Fork	160	24	400
(5) Union, Andrews; Clear Fork	40	.....	320
(6) Wheeler Ellenburger, Winkler; Ellenburger	40	30	400
Miscellaneous*	...	.....	1,040
Total			3,940

*(7) Clabberhill, (8) Olson (gas), (9) Lloyd, (10) Shannon.



(11) West Sand Hills, (12) Vincent, (13) Mule Creek, (14) Unnamed, (15) Unnamed, (16) McCamey-Silurian, (17) Keystone-Holt.

Extensions

Field and county; producing formation—	Acreage proven (ac.)	Formation thickness (ft.)	Estimated reserves (thou. bbl.)
(18) Abell, Peos; Ordovician, Simpson	160	40	1,450
(19) Apco-Warner, Pecos; Ellenburger	500	65	4,500
(20) Barnhart, Reagan; Ellenburger	1,200	275	7,200
(21) Embar Ellenburger, Andrews; Ellenburger	400	180	4,000
(22) Embar Permian, Andrews; Clear Fork, Permian	400	40	2,000
(23) Emperor, Winkler; Yates	320	50	1,500
(24) Fullerton, Andrews; Clear Fork, Wichita-Albany	3,000	245	30,000
(25) Goldsmith, Ector; San Andres	400	60	3,000
(26) Iatan-East Howard; San Andres	400	30	2,000
(27) Keystone, Colby, Winkler; sand	320	125	1,200
(28) Mascho, Andrews; San Andres	5,000	50	15,000
(29) Sand Hills, Crane; Tubb, Clear Fork	200	150	1,500
(30) Seminole, Gaines; San Andres	450	175	3,000
(31) Shipley, Ward; Yates	300	50	1,000
(32) Slaughter, Cochran, Hockley & Terry; San Andres	8,000	60	30,000
(33) Wasson, Yoakum and Gaines; San Andres	2,000	175	7,000
(34) Weiner, Winkler; Whitehorse	640	100	2,000
Total			116,350

WEST CENTRAL TEXAS

Discoveries

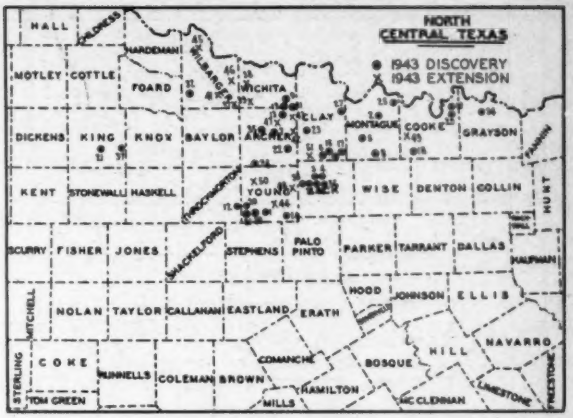
(1) Eliasville-Mississippi; Stephens; Mississippi lime	120	6	300
(2) South Noodle, Jones; Noodle Creek lime	200	4	400
Miscellaneous*	...	.....	880
Total			1,580

*(3) Brown, (4) Cook, (5) Corbett ranch, (6) Hardy, (7) Patterson, (8) Rock Crusher, (9) Noodle Creek, (10) Winters.

Extensions

(11) Coker, Coleman; Morris sand	160	80	320
(12) Stith, Jones; Flippen, Gunsight	160	24	320
(13) Wimberly, Jones; Gunsight, lower Hope lime	1,400	35	7,000
Miscellaneous*	...	.....	2,650
Total			10,290

*(14) Merkel, (15) Reddin, (16) Strand, and others.



NORTH TEXAS

Discoveries

Field and county; producing formation—	Acreage proven (ac.)	Formation thickness (ft.)	Estimated reserves (thou. bbl.)
(1) Allan, Young; Caddo and Canyon lime	340	20	1,280
(2) Dodson, Montague; Bend conglomerate	160	10	480
(3) Ellis, Jack; Caddo lime	440	29	2,640
(4) Hoefle, Jack; Strawn sand	360	18	900
(5) Hildreth, Montague; Bend conglomerate	1,000	25	6,000
(6) Jay, Clay; Strawn lime	300	25	1,200
(7) Little Wichita, Archer; Caddo lime	200	10	800
(8) Mueller, Montague; Caddo lime	240	19	720
(9) West, Wichita; Strawn sand	200	30	750
(10) Walnut Bend, Cooke; Winger (Strawn)	1,000	40	6,500
Miscellaneous*	...	.....	5,040
Total			26,290

*(11) Airport, (12) Batchler, (13) Browning, (14) Bunger, (15) Burns-Midway, (16) Stephens, (17) Bellvue, (18) Dangelmayer, (19) Davidson, (20) Donnell, (21) Guthrie, (22) Henry, (23) Halsell, (24) Ickert, (25) Illinois Bend, (26) Jermyn, (27) Maddox, (28) McDonald, (29) McGeorge, (30) Murray, (31) Murray-Caddo, (32) McCrary, (33) Peek, (34) Pottsboro, (35) Taylor, (36) Weir, (37) Guthrie.

Extensions

(37) Consolidated, Wilbarger; Ellenburger	640	10	2,000
(38) Electra, Wichita; Ellenburger	300	12	600
(39) K.M.A.-Ellenburger, Wichita; Ellenburger	320	30	1,920
(40) K.M.A., Wichita; Strawn	320	20	960
(41) Rock Crossing, Wilbarger; Ellenburger	240	15	720
(42) Scotland, Archer; Caddo and Chappel lime	320	22	640
(43) Vogtsberger, Archer; Strawn	640	40	2,560
(44) Lupton and McLester, Young; sand	400	12	800
Miscellaneous*	...	.....	10,850
Total			21,050

*(45) Fargo, (46) Harrold, (47) Hull-Silk, (48) Knox-Mississippian, (49) Muenster, (50) Padgitt, (51) Watson, and others.

SOUTHEAST NEW MEXICO

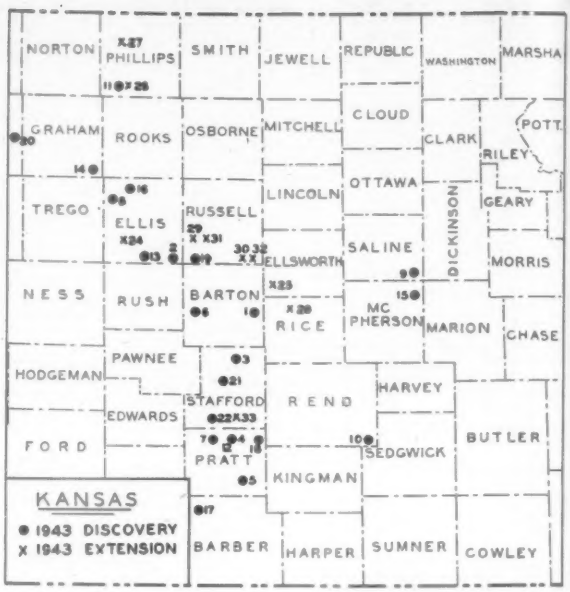
Discoveries

(1) Benson, Eddy; Whitehorse lime	80	8	100
(2) Fenton, Eddy; Delaware sand	40	11	60
(3) San Simon, Lea; San Andres lime	40	73	80
(4) Turkey Track, Eddy; lime	40	35	60
Total			300

Extensions

(1) Lynn, Lea	320	60	1,000
(2) Maljamar, Lea and Eddy; San Andres	1,200	60	4,000
(2) South Eunice, Lea; Yates	400	50	1,000
(4) Square Lake, Eddy; Grayburg	800	75	3,000
Miscellaneous*	...	.....	5,000
Total			14,000

*(5) Arrowhead, (6) Eunice, (7) Getty, (8) Grayburg-Jackson, (9) Loco Hills, (10) Rhodes, (11) South Lovington, (12) Vacuum.



OKLAHOMA

Discoveries

Field and county; producing formation—	Acreage proven (ac.)	Formation thickness (ft.)	Estimated reserves (thou. bbl.)
(1) Big Bend, Osage; Layton	160	52	1,800
(2) Dill, Northeast, Okfuskee; Cromwell	360	18	4,050
(3) Edmond, West, Oklahoma; Hunton	840	20	14,500
(4) Glencoe, Payne; Misener	40	21	220
(5) Hickory Grove, Creek; Prue	40	23	200
(6) Horns Corner, Hughes; sand	200	10	8,050
(7) Ingalls, East, Payne; Misener	40	6	1,600
(8) Lake Shawnee, Pottawatomie; Wilcox	40	8	200
(9) McCloud, North, Lincoln; Wilcox	120	6	650
(10) McComb, South, Pottawatomie; Hunton	80	16	220
(11) Stella, Cleveland; sdy. dolomite	40	17	200
(12) Stroud, Southeast, Creek; Prue	280	14	1,200
(13) Spaulding, South, Hughes; Booch	80	22	220
(14) Sams, Northeast, Noble; Misener	80	14	220
(15) Tyrola, East, Seminole	280	50	450
(16) Wanette, Pottawatomie; Viola	80	550	600
Miscellaneous	....	....	695
Total			35,075

Extensions

(17) Brooksville, South, Pottawatomie; Hunton	40	26	220
(18) McComb, Pottawatomie; Hunton	40	6	100
Total			320

KANSAS

Discoveries

(1) Ames, Barton; Lansing	120	7	600
(2) Beeching, Ellis; Lansing	200	4	1,200
(3) Byron, Stafford; Arbuckle	40	3	250
(4) Carmi, Pratt; Arbuckle	2,500	30	15,000
(5) Chitwood, Pratt; Simpson	160	3	900
(6) Eveleigh, Barton; Sooy sand	40	12	300
(7) Frisbie, Pratt; Viola	160	64	900
(8) Gugler, E., Ellis; Arbuckle	40	15	240
(9) Hunter, Salina; chat	520	15	1,800
(10) Hilger, N., Reno; Viola	40	3	300
(11) Hansen, Phillips; Lansing	160	28	500
(12) Iuka, N., Pratt; Arbuckle (in Carmi)	....	2	.....
(13) Leiker, Ellis; Lansing	80	6	420
(14) Morel, South, Graham	200	4	1,200
(15) Paden, McPherson; chat	40	18	400
(16) Riverview, Ellis; Arbuckle	240	8	1,400
(17) Sun City, Northwest, Barber; Lansing	80	20	600
(18) Stark, North, Pratt; Viola	160	8	600
(19) Strecker, Russell; Arbuckle	80	20	420
(20) Studley, Sheridan; Lansing	200	9	1,200
(21) Spangenburg, Stafford; Arbuckle	80	6	400
(22) Van Lieu, Stafford; Arbuckle	160	15	1,800
Miscellaneous	....	.....	2,705
Total			33,135

Extensions

(23) Bonaccord, Dickinson; Burbank	40	2	240
(24) Kraus, Ellis; sand	120	7	200
(25) Stoltenberg, Ellsworth; Lansing	40	30	200
(26) Hansen, Phillips; Arbuckle	40	28	.....
(27) Dayton, Phillips; Lansing	40	81	420
(28) Chase, Rice; Sooy sand	120	3	600
(29) Krug, Russell; Lansing	40	7	200
(30) Kastrup, Russell; Lansing	80	13	400
(31) Hall-Gurney, Russell; Gorham	80	3	225
(32) Dubuque, Russell; sand	80	18	150
(33) Zenith, Stafford; Viola	160	5	800
Total			3,435

INDIANA

Discoveries

(36) Inman, East, Posey; Aux Vases	40	17	....
(37) Mount Carmel, North, Gibson; Cypress	40	11	....
(38) Owensville, North, Gibson; McClosky and Cypress	400	10	2,800
(39) Rogers, Posey; Clore	40	5	....
(40) Rogers, East, Posey; Waltersburg	40	14	....
(41) St. Francisville, East, Knox; McClosky	80	4	....
(42) Wheeling, Gibson; Hardinsburg	40	5	....
Miscellaneous	....	....	1,600
Total			4,400

UPPER TEXAS GULF COAST

Discoveries

Field and county; producing formation—	Acreage proven (ac.)	Formation thickness (ft.)	Estimated reserves (thou. bbl.)
(1) Chesterville, Colorado; Cockfield-Wilcox	300	40	250
(2) Cottonwood, Liberty; Frio	100	6	250
(3) Double Bayou,* Chambers; Frio	200	5	1,000
(4) East Turtle Bay, Chambers; Marginulina	200	7	200
(5) Halls Bayou, Brazoria; Frio†	300	22	500
(6) Jackson Pasture, Chambers; Frio	500	6	1,000
(7) North Katy, Waller-Harris; upper Saline Bayou	500	10	2,000
(8) Kirby, Liberty; upper Saline Bayou	200	30	2,000
(9) Little Kentucky, Jackson; Frio	200	6	600
(10) Pinehurst, Montgomery; Wilcox	400	22	3,000
(11) Ramsey, Colorado; Wilcox	320	20	250
(12) South El Camp, Wharton; Frio	100	10	500
Miscellaneous‡	...	.....	110
Total			11,660

*First oil. †43.9 gravity and generally called crude oil but analysis shows this to be condensate; reservoir pressure is 8,500 lb. ‡Includes (13) Benneview, (14) Manefee, (15) Sugar Valley.

Extensions

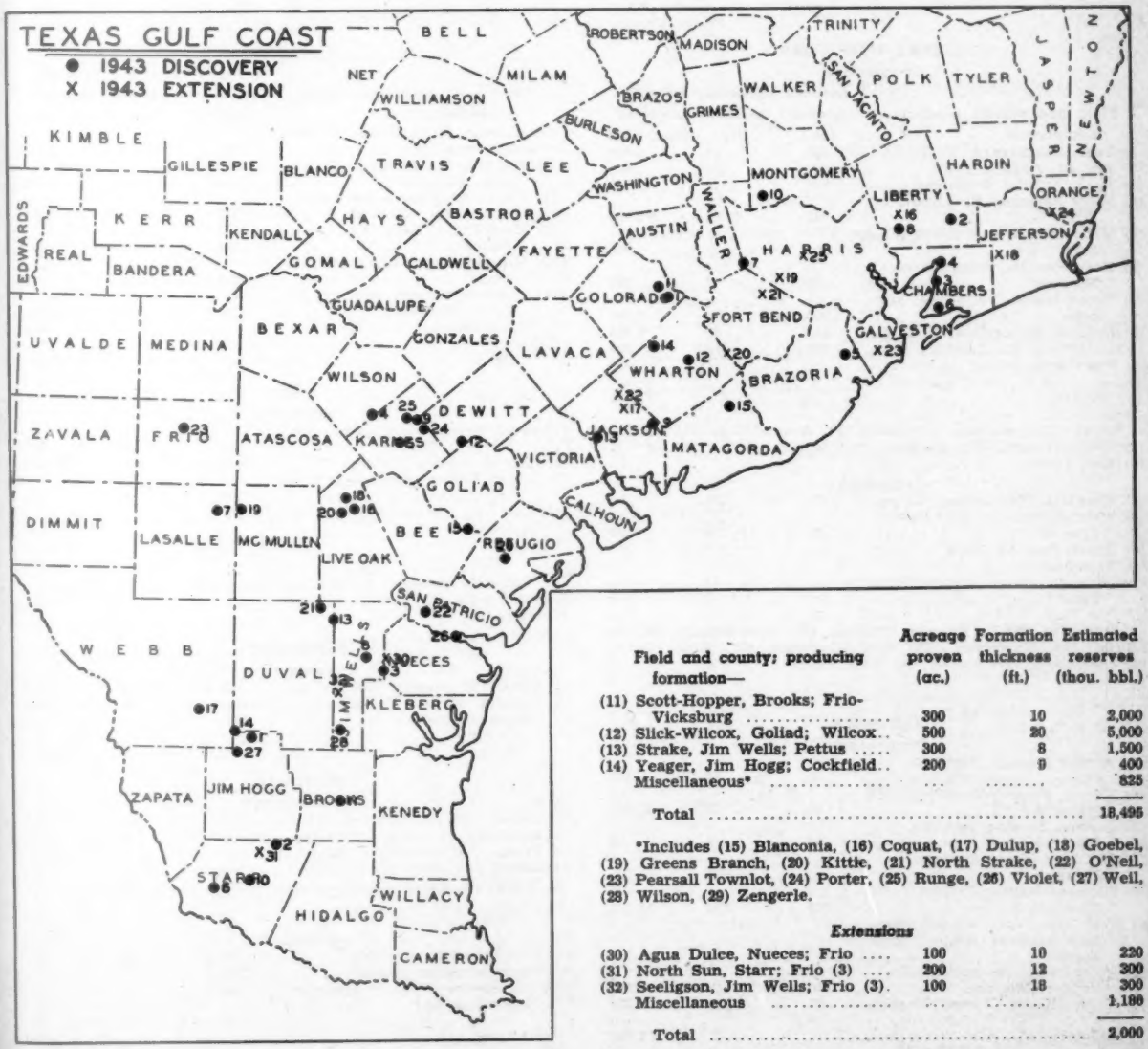
Field and county; producing formation—	Acreage proven (ac.)	Formation thickness (ft.)	Estimated reserves (thou. bbl.)
(16) Esperson, Liberty, Yegua	100	10	300
(17) Mayo, Jackson; Frio (2)	100	8	200
(18) Stowell, Jefferson	...	.....	2,000
Miscellaneous*	...	.....	475
Total			2,975

*Includes (19) Alief, (20) Boling, (21) Clodine, (22) Ganado, (23) Hitchcock, (24) Port Neches, (25) Satsuma.

SOUTHWEST TEXAS

Discoveries

(1) Armstrong, Jim Hogg; Jackson	160	8	300
(2) Cameron, Starr; Frio-Vicksburg	150	16	1,250
(3) Stratton, Kleberg; Vicksburg	100	10	300
(4) Hobson, Karnes; Wilcox	300	10	3,000
(5) Hondo Creek, Karnes; Wilcox	100	14	250
(6) Lockhart, Starr; Pettus	300	16	600
(7) New Mexico, La Salle; Wilcox	200	25	250
(8) North Magnolia City, Jim Wells; Frio	300	20	1,500
(9) North Porter, Karnes; Pettus	200	10	1,000
(10) Ross, Starr; Vicksburg	300	14	320

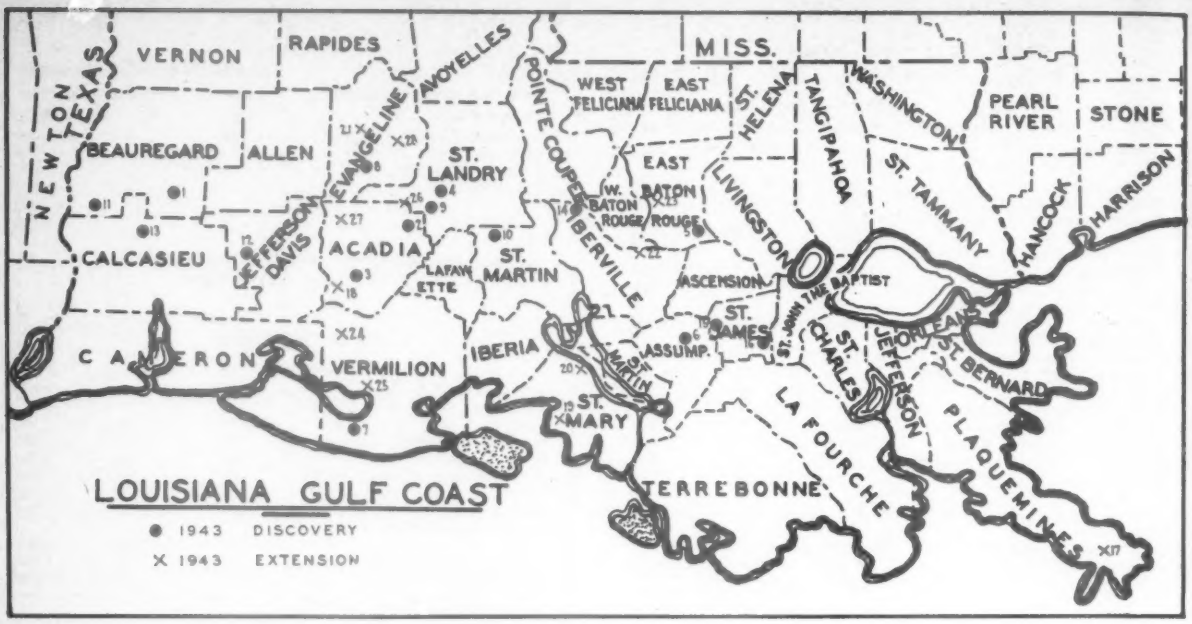


Field and county; producing formation—	Acreage proven (ac.)	Formation thickness (ft.)	Estimated reserves (thou. bbl.)
(11) Scott-Hopper, Brooks; Frio-Vicksburg	300	10	2,000
(12) Slick-Wilcox, Goliad; Wilcox	500	20	5,000
(13) Strake, Jim Wells; Pettus	300	8	1,500
(14) Yeager, Jim Hogg; Cockfield	200	9	400
Miscellaneous*	...	.....	825
Total			18,495

*Includes (15) Blanconia, (16) Coquat, (17) Dulup, (18) Goebel, (19) Greens Branch, (20) Kittie, (21) North Strake, (22) O'Neil, (23) Pearsall Townlot, (24) Porter, (25) Runge, (26) Violet, (27) Weil, (28) Wilson, (29) Zengerle.

Extensions

(30) Agua Dulce, Nueces; Frio	100	10	220
(31) North Sun, Starr; Frio (3)	200	12	300
(32) Seeligson, Jim Wells; Frio (3)	100	18	300
Miscellaneous	...	.....	1,180
Total			2,000



LOUISIANA GULF COAST

Discoveries

Field and parish; producing formation—	Acreage proven (ac.)	Formation thickness (ft.)	Estimated reserves (thou. bbl.)
(1) Bear, Beauregard; Frio	360	8	2,000
(2) Branch, Acadia; Frio	300	4	1,000
(3) Egan, Acadia; Oligocene	640	15	500
(4) Krotz Springs,* St. Landry; Frio	640	15	2,500
(5) Mallett Bluff, East Baton Rouge; Frio	300	7	1,500
(6) Napoleonville, Assumption; Miocene	30	7	200
(7) Pecan Island, Vermilion; Miocene	2,500	15	2,000
(8) Reddell, Evangeline; Sparta	640	40	1,000
() Shutestown, St. Landry; Frio	300	10	1,500
Miscellaneous†	...	.....	580
Total			12,780

*First oil production. †Includes (10) Arnaudville, (11) Mystic, (12) North Welch, (13) Perkins, (14) Rosedale, (15) St. James; (16) East Hester.

Extensions

(17) West Bay, Plaquemines; Miocene	100	10	300
(18) West Mermentau, Jeff Davis; Frio (2)	100	30	300
(19) Bayou Sale, St. Mary	...	.....	200
Miscellaneous *	...	.....	715
Total			1,515

*Includes (20) La Fourche Crossing, (21) Pine Prairie, (22) St. Gabriel, (23) University, (24) West Gueydan, (25) White Lake, (26) Lewisburg, (27) Richie, (28) Ville Platte.

CALIFORNIA

Discoveries

(1) Arroyo Grande, San Luis Obispo; Pismo, Miocene	40	60	200
(2) Burrel, Fresno; Temblor, Miocene	40	12	200
(3) Lanare, Fresno; Temblor, Miocene	40	7	75
(4) McClung, Kern; Stevens, Miocene	40	12	200
(5) Pleasant Valley, Fresno; Gatchell, Eocene	300	200	10,000
(6) West Raisin City, Fresno; Temblor, Miocene, Kreyenhagen, Eocene	200	25	1,525
(7) West Round Mountain, Kern; Vedder, Miocene	40	15	250
(8) Tejon, Kern; Chanac, Pliocene	25	220	250
Total			12,700

Extensions

Field and county; producing formation—	Acreage proven (ac.)	Formation thickness (ft.)	Estimated reserves (thou. bbl.)
(9) Antelope Hills, Kern; Temblor,* Miocene	100	100-165	2,500
(10) Belridge-South, Kern; Etchegoin, Pliocene	1,250	150-500	7,500
(11) Cat Canyon, Santa Barbara; Los Flores, Miocene	320	300-700	7,500
(12) Kern Front, Kern; Etchegoin, Pliocene	750	75-200	7,500
(13) Midway, Kern; Republic, Pliocene	80	185	800
(14) Ventura Avenue, Ventura; D-7 Zone, Pliocene	500	600	25,000
Miscellaneous*	...	.....	400
Total			51,200

OHIO

Extensions

(1) Brush Creek, Muskingum and Morgan; Clinton	200	30	100
(2) Clayton, Perry; Clinton	880	40	857
(3) Mount Vernon-Coshocton; Knox and Coshocton; Clinton	220	25	110
(4) Zanesville, Muskingum; Clinton	200	40	202
Miscellaneous*	...	.....	271
Total			1,540

*Includes Ashland, Cambridge, Cleveland, Corning, Hinckley, Layland, New Straitsville, Stewart, Sugar Grove-Newark, Thorn, Wooster, etc.

MISSISSIPPI

Discoveries

(1) Cranfield, Adams; Wilcox	640	10	1,000
(2) Eucutta, Wayne; Tuscaloosa	1,000	10	2,500
Miscellaneous*	260	.....	200
Total			3,700

MICHIGAN

Discoveries

(1) Cedar, Osceola; Dundee	350	3	1,500
(2) Goodwell, Newaygo; Traverse	1,000	15	2,400
(3) Prosper, Missaukee; Dundee	400	5	1,200
(4) Rose Lake, Osceola; Traverse	200	15	1,500
(5) Woodville, Newaygo; Traverse	250	20	400
Total			7,000

Extensions

(6) Evart, Osceola; Dundee	1,200	10	5,000
(7) Fork, Mecosta; Dundee	350	5	1,750
(8) Van Buren County;* Traverse	200	5	800
Miscellaneous	...	.....	750
Total			8,300

ILLINOIS

Discoveries

Field and county; producing formation—	Acreage proven (ac.)	Formation thickness (ft.)	Estimated reserves (thou. bbl.)
(1) Belle Rive, Jefferson, McClosky	200	11	800
(2) Bennington, Edwards; Aux Vases	80	37	40
(3) Bogota, Jasper; McClosky	240	25	960
(4) Browns, Edwards; Cypress	40	38	100
(5) Bessie, Franklin; Levias	40	15	80
(6) Covington, South, Wayne; McClosky	280	30	1,120
(7) Calvin, North, White; Bethel	920	11	1,200
(8) Divide, Jefferson; McClosky	120	30	480
(9) Ellery, South, Edwards; McClosky	80	40	280
(10) Exchange, Marion; McClosky	80	15	280
(11) Grayville, West, Edwards	120	..	600
(12) Hill, Effingham; McClosky	80	20	280
(13) Ingraham, Clay; McClosky	40	15	80
(14) Johnsonville, North, Wayne; Levias-McClosky	40	....	320
(15) Lancaster, West, Edwards; Levias	1,000	16	2,000
(16) Laclede, Fayette; Bethel	40	18	100
(17) Mount Vernon, Jefferson; Aux Vases	200	9	800
(18) Mount Auburn, Christian; Silurian	40	10	80
(19) Maple Grove, Edwards; McClosky	400	30	2,420
(20) Marine, Madison; Devonian	40	69	80
(21) Markham City, North, Jefferson; McClosky	280	18	1,120
(22) Parkersburg, West, Richland; McClosky	80	5	320
(23) Toliver, East, Clay; McClosky	40	9	160
(24) West Frankfort, South, Franklin; Tar Springs	320	33	1,000
Total			15,060

Extensions

Field and county; producing formation—	Acreage proven (ac.)	Formation thickness (ft.)	Estimated reserves (thou. bbl.)
(25) Sims, North, Wayne	200	....	1,000
(26) Phillipstown, White	300	....	3,000
(27) Barnhill, East, Wayne	100	....	1,500
(28) Iola, Clay	580	....	5,000
(29) Schnell, Richland	50	....	500
(30) Friendsville, Wabash	120	....	460
(31) Mount Erie, Wayne	100	....	400
(32) Blairsville, Hamilton	100	....	1,000
(33) Grayville, West, Edwards	200	....	300
(34) Coil, West, Jefferson	50	....	300
(35) Maunee, North	70	....	600
Miscellaneous	...	....	1,000
Total			20,060

EAST TEXAS

Discoveries

(1) Campbell, Hunt; Paluxy sand	80	8	200
(2) Hawkins, Wood; Georgetown lime	40	20	160
	40	20	160
(3) Manziel (Cartwright), Wood; Paluxy sand	300	43	1,500
(4) Henderson, Rusk; Pettit lime	40	14	160
(5) New Hope, Franklin; Travis Peak and Rodessa	120	15-70	960
(6) Tri-Cities, Henderson; Pettit lime	640	25	5,250
Total			8,230

Extensions

(7) Chapel Hill, Smith; Pettit lime: Rodessa	320	80	1,500
(8) Hawkins, Wood; Woodbine sand	500	75	3,000
(9) Kildare, Cass; Gloyd	800	25	3,000
(10) Quitman, Wood; Paluxy sand	2,000	40	12,000
Miscellaneous*	...	.....	1,000
Total			20,500

*Includes (11) Cayuga, (12) Grapeland, (13) Pittsburg, (14) Weiland pools.

ARKANSAS

Discoveries

Field and county; producing formation—	Acreage proven (ac.)	Formation thickness (ft.)	Estimated reserves (thou. bbl.)
(1) Atlanta, W., Columbia; dual completion, Cotton Valley and Smackover	40	12	500

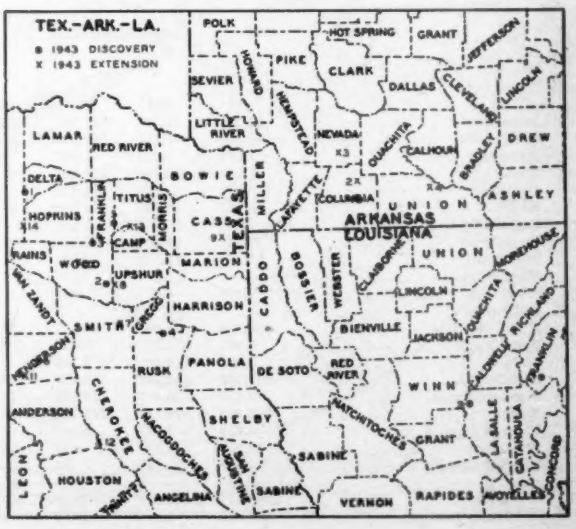
Extensions

(2) Mount Holly, Columbia; Cotton Valley	40	4	250
(3) Stephens, Nevada; sand	120	6	750
(4) Rainbow City, Union; sand	80	4	500

NORTH LOUISIANA

Discoveries

(1) Holly Ridge	120	30	900
(2) La Salle Parish, Wilcox	...	4	200
Miscellaneous	...	...	300



PRODUCTION— Hits New Peak, Higher in 1944

DOMESTIC crude-oil production of 1,495,371,000 bbl. in 1943 set an all-time record. The unprecedented production rate of 4,097,000 bbl. daily was achieved entirely by drawing more intensely on the nation's flush fields in Texas, California, Kansas and New Mexico. Production from Texas alone registered an increase of 111,301,000 bbl. which more than equalled the national increment of 107,994,000 bbl.

Eight States Increase

Higher production was registered in eight producing states while a dozen suffered losses, topped by the decline of 29,075,000 bbl. in Illinois, down 27 per cent from 1942 production of 106,590,000 bbl. The slump in Illinois marked the third consecutive year in which production has declined although the 1943 reduction was significant because of the accelerated rate of drop. Last year's production in Illinois was 27 per cent below the 1942 output. Since 1940 when Illinois reached its all-time peak of 149,484,000 bbl., the decline has amounted to 47 per cent. There are no current developments to indicate that the decline in Illinois will be arrested, and it would not surprise close observers of conditions in that state if another reduction of the 1943 magnitude occurs this year.

The six major producing states of the nation which qualified in this order during 1943: Texas, California, Louisiana, Oklahoma, Kansas and Illinois, accounted for 87.1 per cent of all domestic crude oil last year. In 1942, the same six states produced 86.1 per cent of the total. Louisiana rose above Oklahoma in 1943 to become the third largest producing state. Likewise, Kansas moved above Illinois in the lineup because of the decline in the latter state and another increase of 8,818,000 bbl. in the former. The increase in Kansas was more moderate than some operators considered well within capacity of the state. The conservative policy of the Kansas Corporation Commission in restricting production from its flush fields, however, was contended later in the year to have been a prudent program because water encroachment in some of the state's larger fields has been retarded and the current rate of withdrawal has been sustained without undue strain on the productive capacity.

Previous Trends Reversed

Greater dependence of the nation on the larger producing states, as reflected by the accompanying table, reverses the indicated trend of 1942 and restored relative rates of withdrawal to the level prevailing in 1941. Most of the burden of again lifting the six states to produce more than 87 per cent of the nation's crude oil fell on Texas and California. Texas, for example, produced 40 per cent of all domestic crude oil brought to the surface in 1943 compared to 34.4 per cent in 1942. California which produced only 17.8 per cent of the nation's oil in 1942 lifted its output to 19.1 per cent in 1943. Much of the higher production in Texas last year can be assigned to virtual completion of the wartime transportation facilities, establishing an outlet for 8,000,000 to 9,000,000 bbl. of crude a month.

California's higher production rate is entirely attributable to greater military demands in the Pacific theater. California production of 284,286,000 bbl. exceeded all records for that state excepting the all-time high of 292,534,000 bbl. in 1929. Thus, the state temporarily answered those who doubted its ability to respond to greater demand. The state's output, however, fell approximately 30,000,000 bbl. short of meeting demand and this volume of petroleum was withdrawn from stocks during the year. The draw down on inventories of motor fuel was particularly acute, leaving supplies of this product at critical levels at the start of 1944. Already, California production is being supplemented by tank-car shipments from Texas and other inland sources of supply in order to meet the requirements which, federal officials assert, will continue to rise until Japan is defeated.

Kentucky Up 89 Per Cent

From a relative standpoint, the increase of 3,722,000 bbl. in production by Kentucky, a rise of 89 per cent over 1942, was the most spectacular registered by any state. New fields in the western end of the state discovered late in 1942 and developed last year were solely responsible for

Production in United States, 1937-43

(In thousands of barrels)

	1937	1938	1939	1940	1941	1942	1943	Change	Producing wells 1-1-44	Dly. av. bbl. per well	Cumulative prod.
Arkansas	12,181	18,357	21,383	26,072	26,301	26,570	27,606	+1,036	3,020	25.0	607,299
California	238,582	249,930	225,493	223,104	230,317	247,132	284,286	+37,154	19,724	39.5	6,374,003
Colorado	1,578	1,324	1,415	1,412	1,734	2,309	2,431	+122	165	40.4	74,564
Illinois	7,426	22,800	92,203	146,484	128,550	106,590	77,537	—29,075	23,623	9.4	1,009,682
Indiana	821	968	1,711	4,978	6,536	6,609	5,343	—1,266	2,052	7.1	142,343
Kansas	69,158	58,135	60,973	64,832	81,899	96,879	105,697	+8,818	22,889	12.7	1,348,790
Kentucky	5,497	5,834	5,621	5,188	4,811	4,169	7,891	+3,722	14,208	1.5	149,945
Louisiana	90,427	94,955	94,182	103,410	117,634	128,231	125,780	—2,451	6,801	50.7	1,418,151
Michigan	16,411	19,139	23,563	19,733	16,325	21,748	20,535	—1,213	3,347	16.8	203,902
Mississippi	.....	.....	107	4,400	16,324	27,545	18,868	—8,677	370	139.7	67,860
Montana	5,799	4,825	5,853	6,583	7,344	8,045	7,641	—404	2,080	10.1	105,533
Nebraska	.....	.....	2	276	1,713	1,276	814	—462	58	38.4	4,254
New Mexico	38,438	36,009	37,872	39,488	39,566	31,914	38,924	+7,010	3,940	24.5	381,791
New York	5,485	5,045	5,098	4,999	5,126	4,968	4,313	—655	21,400	0.5	143,879
Ohio	3,550	3,297	3,156	3,159	3,284	3,563	3,185	—478	23,300	0.4	595,335
Oklahoma	223,107	169,307	152,400	149,629	153,167	137,792	120,559	—17,233	52,913	6.2	5,207,410
Pennsylvania	19,174	17,449	17,832	17,353	16,492	17,824	16,751	—1,073	82,000	0.6	1,047,152
Texas	502,967	470,760	782,335	489,183	501,348	477,828	589,129	+111,301	98,170	16.4	8,196,467
West Virginia	3,829	3,725	3,580	3,444	3,378	3,492	3,158	—339	16,720	0.5	423,563
Wyoming	19,637	18,956	21,207	26,232	30,009	32,736	34,766	+2,040	3,733	25.5	599,257
Miscellaneous	60	60	94	71	62	57	57	.....	156	1.0	1,271
Total	1,264,117	1,200,875	1,254,630	1,340,030	1,391,920	1,387,377	1,495,371	+107,994	400,669	10.2	28,002,260
Daily average	3,463	3,290	3,428	3,671	3,813	3,801	4,097	.....	.....	....	.....

the increase. It is doubtful that Kentucky's higher rate of production can be sustained for another year unless additional new fields are discovered for the reason that withdrawals from existing pools were higher than justified under other than emergency conditions. Declining production in Illinois and Oklahoma created an acute shortage of crude oil in District 2, leaving refiners, producers and government officials little choice but to pitch withdrawals from flush areas at maximum levels.

Statistics on the average daily production per well show some interesting conclusions and in general follow the curve on total output. The decline of nearly 32 per cent in Mississippi's production, for example, was accompanied by a drop in the average per well output from 202.3 bbl. daily in 1942 to 139.7 bbl. last year. The per-well withdrawal in Mississippi, of course, is the highest in the nation and comes chiefly from the Tinsley and Pickens fields. Other discoveries were registered during the final months of 1943 which may be developed this year to the extent necessary to halt the downward trend of total production and retard the inordinate drain on existing fields.

Per Well Average Unchanged

The national average of 9.2 bbl. daily per well during 1943 is virtually unchanged from 1942. Still, the fact that approximately 5,500 fewer wells were on the active producing list January 1 indicates more strikingly the heavier withdrawals from areas with reserve productivity. The reduction in active wells appears to confirm the arguments advanced during the year that wartime economic conditions, a static price for crude oil and rising operating costs, are hastening the abandonment of marginal properties. Furthermore, the reduced number of wells is related to the shortage of tubular goods and other producing equipment. The table points out, however, that more than 7,000 wells were removed from the total for Illinois where hundreds of wells in the older stripper areas are idle, pending economic inducements for installation of secondary-recovery equipment or for resuming this type of marginal production which cannot be justified under existing crude-oil ceilings and the cost of materials.

The increase of approximately 1,500 producing wells in Wyoming is not a reflection of drilling activity. Rather, the current number of wells includes those reported in active operation and indicates improving demand for crude oil from the Rocky Mountain district, permitting operators to resume production from wells which were previously shut in. Approximately 1,500 fewer wells were active in Ohio on January 1 than reported a year ago and 1,000 were dropped from the West Virginia total for the same reasons as those prevailing in Illinois and Kentucky.

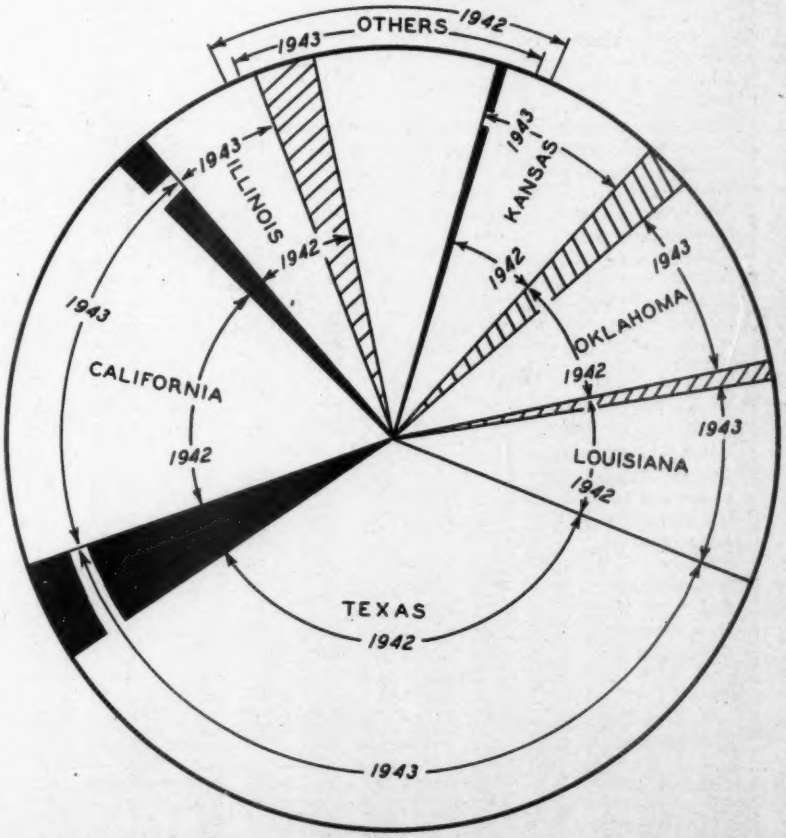
Details on production by fields and districts are published with other pertinent operating data in this issue, starting on page 169. Included are data on completions during the year by fields and months.

An equally impressive production increase was registered in the so-called light liquid products, natural gasoline and condensate. Most recent statistical data show that current production of natural gasoline and allied hydrocarbon products is approximately 280,000 bbl. daily, a gain of nearly 10 per cent since the middle of 1943. Completion of new condensate plants on the Gulf Coast and Pacific Coast in the near future will add substantially to the current production of liquid phase hydrocarbons. Operators of recycling and pressure-maintenance plants are receiving special consideration from federal agencies and state regulatory bodies for expansion of facilities because of the desirable character of production in the manufacture of aviation gasoline.

Many states containing condensate fields and recycling plants are showing production of these operations separate from crude oil. Others, however, lump all liquid products under the simple classification of oil. Consequently the production figures on crude oil are subject to minor degree of error in those states which combine data on all liquid petroleum products.

On the basis of 1943 production, the country's condensate and natural-gasoline reserves probably amount to 1,500,000,000 bbl., although the gaps in specific information on volume of recovery in Texas, the proven acreage, number of wells, sand thickness and other data reduce this calculation to a sparsely supported estimate.

New recycling plants under construction and scheduled for completion this year will increase recovery of condensate approximately 35,000 bbl. per day, bringing a probable average production for this year in the range of 300,000 bbl. daily. Emphasis on cycling operations springs from the value of condensate in the aviation-gasoline program.



Relative positions of the six major producing states changed substantially in 1943 with solid black portions of the chart indicating the increases in Texas, California and Kansas while the open-line field reflects the relative reductions in Illinois, Oklahoma and Louisiana

Recent Surge in Well Completions Fails to Offset First-Half Decline

by H. Stanley Norman

AN increase of 15 per cent in well completions during the last half of 1943, a surge in drilling operations which is programmed to cover 24,000 wells this year, failed to offset the more substantial decline in the first 6 months of last year. The net deficit of 266 wells, a decline of 1.4 per cent from 1942, was nevertheless a much more moderate reduction than early 1943 conditions had indicated.

Numerically, the decline of 506 completions in the eastern fields was the most severe reduction. Much of the reduction in eastern states is explainable by the lack of economic inducement to expand secondary-recovery operations and to the failure of exploratory drilling to open new areas for development.

Eleven oil states reported increases in drilling, ranging from the substantial rise of 619 wells in California, a gain of nearly 75 per cent, to a 5-well incline in Nebraska.

Completion of 10,065 wells during the last 6 months of 1943, an increase of 15 per cent over the total of 8,756 registered during the same half of 1942, shows how the industry responded to liberalized spacing rules and modified restrictions on the use of materials. Furthermore, the current trend of drilling activity is to be continued upward, reaching a 1944 peak during the third quarter. Through the emergency expedient of loosening regulations where necessary, the Petroleum Administration for War is committed to fulfillment of its 24,000-well program this year in order to come as near as possible to supplying the crude oil and products necessary for military and essential-civilian requirements.

Summary of Completions in All Fields

	Oil	Gas	Dry	Total	Average footage	1942 total
Eastern	2,032	819	218	3,066	1,947	3,572
Ohio	152	434	393	979	2,546	1,145
Indiana	96	11	140	247	1,733	387
Kentucky	243	192	251	686	1,802	260
Michigan	235	47	348	630	2,464	663
Illinois	1,048	12	693	1,751	2,686	2,029
Mississippi	31	0	84	115	5,518	71
Alabama	0	0	8	8	2,633	4
Florida, Georgia	1	0	8	9	6,700	4
Kansas	580	26	619	1,735	3,347	1,519
Nebraska	7	0	35	42	2,857	37
Missouri, Iowa	2	1	22	25	1,115	13
Oklahoma	343	92	549	1,184	3,332	1,159
North Central Texas	684	13	854	1,551	2,841	1,002
Eastern Texas	157	14	139	310	5,706	403
West Texas	717	8	168	891	4,709	1,255
Texas Panhandle	149	30	22	200	2,730	328
Southwest Texas	422	53	481	956	3,026	1,026
Texas Gulf Coast	345	24	244	613	7,056	674
Total Texas	2,373	140	1,898	4,431	4,305	4,688
Louisiana Gulf Coast	219	33	137	389	8,715	434
North Louisiana	128	58	128	313	3,831	445
Arkansas	137	3	103	243	4,307	184
Montana	146	37	65	248	2,322	218
Wyoming	102	6	25	133	4,188	119
Colorado, Utah	11	1	19	31	2,277	25
New Mexico	182	3	62	251	3,085	346
California	1,150	30	267	1,447	3,212	828
Total: 1943	5,717	1,897	6,370	17,984	3,310	
1942	10,833	2,089	5,239	18,150	3,739	18,150
Difference	—506	—192	+731	—266	+92	
Total: 1941	*12,805	3,014	7,111	22,340	3,065	
1940	*11,103	2,300	5,877	20,040	3,949	
1939	*10,653	2,031	5,215	20,939		
1938	*10,121	1,985	5,043	27,149		

*Includes input wells in eastern fields.

Dry-Hole Ratio Rises

Emphasis on exploratory drilling in 1943, encouraged by dual forces, resulted in a rise of the ratio of dry holes to oil wells. Wildcat wells were placed in favored position by the more liberal regulations applying to the use of materials on exploratory locations and by the more readily available financial support from major companies, either in the form of dry-hole commitments or in the purchase of checker-board protection. Encouraging conditions for exploratory operations are carrying over into 1944 for the reason that reserves continued to shrink with failure of the industry to score more abundantly in outstanding discoveries.

Failures among completed wells rose to more than 35 per cent of the total compared to 30.5 per cent dry holes registered in 1942. In 1941, when materials were freely available and restrictions on spacing were nonexistent, the industry realized production either of oil or gas from 78 per cent of all wells drilled and only 22 per cent were commercial failures.

Successful wells declined to 69 per cent of all completions in 1942 and suffered a further contraction to 65 per cent in 1943. Further reflecting the proportionately higher costs of current drilling operations is the comparison that oil wells in 1943 netted only 54 per cent of all completions compared with a previous low record of 57 per cent in 1942 and nearly 60 per cent in 1941.

The increase of 34 per cent in well

completions projected for 1944 is comparatively evenly distributed, excepting District 2 which is composed of the 15 northern Mid-Continent and Middle West states. Here's how the 1943 completions compare with the 1944 program by districts:

District	1943 completions	1944 program	Per cent increase
District 1	3,075	4,250	38
District 2	7,247	8,630	19
District 3	5,711	8,545	49
District 4	404	580	43
District 5	1,447	1,995	38
Total	17,884	24,000	34

One conclusion from the actual completions in 1943 and the 1944 program is that PAW is anxious to concentrate the available materials in states containing fields not yet fully developed and with facilities for making the petroleum products accessible to the military forces. The relatively high program in District 3, for example, is projected partly on the basis of construction now under way on additional transportation and refining facilities.

Replacement Wells Necessary

Furthermore, most districts of Texas were in position to supply required volumes of crude oil during the past 2 years of war partly from productive surpluses built up through peacetime when discoveries and development ran slightly ahead of demand. Two pipe lines are now under construction from West Texas to serve areas growing increasingly short of supplies and these transportation facilities will be placed in service this spring and summer. Numerous fields in the southern part of Texas and Louisiana are falling below their allowables, indicating that additional drilling will be required to maintain the supply of crude for the concentration of war refineries on the Gulf Coast. Consequently, conditions indicate that the increase of 49 per cent in completions desired by PAW in District 3 will be distributed through the four major producing states, Texas, Louisiana, Arkansas, and New Mexico, in ratio to their positions as suppliers.

The next highest increase in projected completions is assigned to the Rocky Mountain district where new discoveries and extensions to proven fields in 1943 opened several major structures to development drilling. Even with the increase of 43 per cent anticipated in District 4, the total projected completion of 580 wells leaves the area substantially behind the other four divisions. For example, District 3 is scheduled to complete more than 15 wells to each 1 finished in the Rocky Mountain region.

The increase of 92 ft. in the average depth of completed wells continued a trend that has been uninterrupted since start of the petroleum industry with exception of the early 1930's when a high concentration of drilling in the comparatively shallow East Texas field broke the upward curve. Completed wells in 1943 averaged 3,250 ft., exclusive of service wells in the eastern states. The total of 58,123,000 ft. of hole drilled by the industry in 1943 compares with 57,317,700 ft. in 1942 but makes a poor showing against the aggregate of 67,445,300 ft. in 1941. Assuming, however, a moderate increase of 50 ft. in the average depth of wells programmed in 1944, the total of 79,200,000 ft. for 24,000 wells will establish an all-time record for the drilling end of the industry.

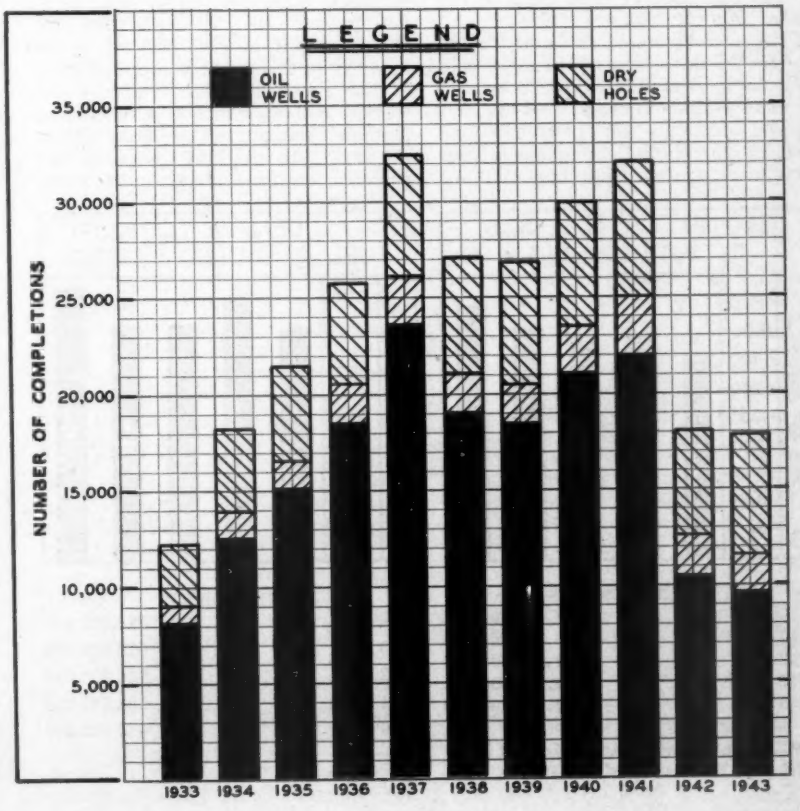
In drilling nearly 25 per cent of all completed wells in the nation last year, Texas operators made 19,030,450 ft. of hole. Southwest Texas completions accounted for 4,804,850 ft. of the total, West Texas operators drilled 4,194,800 ft., and the abnormally active year in North Central Texas accounted for 4,096,190 ft. of the drilling.

One contributing factor to the greater average depth of wells is the spreading practice of completing in multiple producing zones. Another is the tendency in deeper sedimentary beds under existing fields rather than incur the greater risk attached to drilling in unexplored territory on second or third rate prospects.

Supporting the prediction that completions will be sustained or increased above current levels is the assurance from PAW that necessary equipment will be provided through rescheduling of manufacturing operations. Several manufactures of drilling tools now are relieved of their military contracts in order that their facilities may be diverted to production of drill pipe, tool joints, drill collars, boilers, drilling engines and other items essential to operation of the total of 1,363 rotary rigs in operation at the end of December. At the start of 1943, there were only 713 rotary rigs in operation, showing that drilling activity in December had increased nearly 84 per cent over the year's low point.

The program now under way of determining how many drilling rigs are idle and the equipment needed to place them in service is expected to push the completion rate to increasingly larger totals until bad weather next fall decelerates the pace in northern and eastern states. The program of 24,000 wells for this year is exclusive of all types of service wells.

Estimates of tubular requirements this year show that drilling operators will need nearly 7,000,000 ft. of drill pipe to maintain the activity at projected levels. This means that 1 ft. of new drill pipe will be required either for new strings or replacements for each 11 ft. of programmed drilling.



1944 to Bring Demand of 5,000,000 Bbl. Daily

Petroleum refiners in the United States and importers of finished products in 1944, will be called upon to supply a record yearly demand for gasoline and all the other principal refinery products. This includes new yearly peaks in the consumption of natural gasoline and associated products. The expansion of 10 or more per cent for this year follows the record-breaking year of 1943 in which the total demand for all oils was 4 per cent greater than during 1941.

AT the annual meeting of the American Petroleum Institute at San Francisco in November 1941, speakers predicted that the petroleum industry would shortly be called upon to make its products available in this country at the rate of 5 million barrels daily. This prediction will be realized over part of 1944 at least with the possibility that the average demand for all of this year will be in excess of a 5-million-barrel average.

The total demand (domestic and export) estimate for all oils used in this discussion is 1,800,000,000 bbl. (4,900,000 bbl. daily). The magnitude of this consumption possibly can best be appreciated by comparison. The 1944 requirements will be 10 per cent greater than the record-breaking year just brought to a close. The estimated increase in demand of 163,000,000 bbl. for the year exceeds any previous yearly gain in the history of the industry. The 1944 needs will be more than four times the demands of 1918, the last year of the previous war, and 66 per cent greater than those of the boom year of 1929.

The accompanying table and chart reflect the developments in relation to petroleum demands of the war and prewar period. Through 1941 the domestic demands for petroleum increased rapidly reflecting a war-preparedness prosperity among civilians with some expansion in the military demands in this country and elsewhere. It was this rapid increase in demands that caused observers to visualize the 5-million-barrel daily average.

In 1942, total demand for all oils in this country decreased due largely to the efforts to ration civilian use and the fact that the large military demands were not under way until late in the year. Through 1942 and the first half of 1943 the petroleum industry in this country supplied most of the increasing allied military demands. Although rationing of civilian gasoline became effective on a national basis late in 1942, demands for gasoline continued heavy and requirements of most of the remaining products exceeded any previous period. This situation developed despite a shortage in transportation facilities within and outside this country. The contraction in total demands was confined to 1942 and last year requirements jumped to an estimated total of 1,637,000,000 bbl., a gain of nearly 4 per cent over the previous record year of 1941.

This year the greater allied military machine will account for most of the increase in total oil demands in this country. These military gains will center in the enlarged needs for all grades of aviation gasoline and the "all purpose" grade required by the military for automotive and other uses. Demand data on aviation gasoline are not released. The construction program for the remainder of this year points to a production of this high-octane fuel by the end of the year at a rate which will be approximately twice the average daily consumption of all gasolines in 1918.

Just what effect these mammoth aviation requirements will have on the supplies of gasoline available to civilians in this country has not been determined. The experience of well-balanced refineries making maximum quantities of 100-octane motor fuels indicates that yields of civilian fuels will decrease substantially when all construction programs are completed. This is partially due to the losses that result in the manufacture of the highest octane fuels.

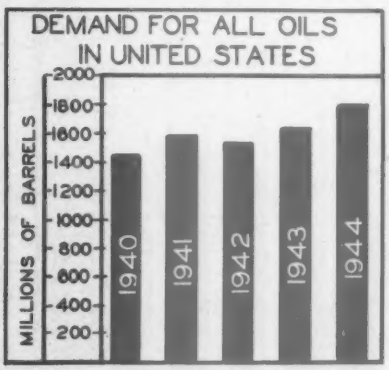
1943 Consumption Exceeded Estimates

With these conditions in mind there are those whose 1944 predictions provide for a reduction in gasoline consumption by civilians in this country during 1944 compared to 1943. In this connection private reports show that the 1943 civilian consumption of gasoline was greater than had been predicted at the start of the year. The rationing program as originally projected has not been 100 per cent effective.

Civilians in this and other countries will consume all the gasoline available in excess of military requirements. Should the military demands prove less than is now projected due to changes in the course of the war, civilian consumption will take up any slack. This means that the estimated over-all demands for 1944 are minimum rather than maximum requirements.

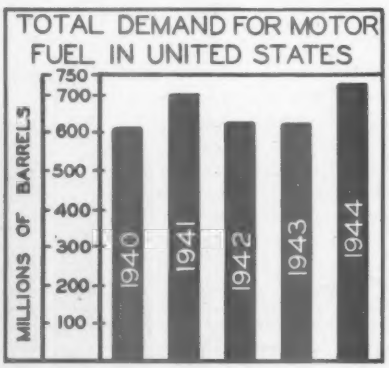
While economy in the civilian use of all the remaining refinery products will continue to be urged, domestic consumption of most of these products will increase in 1944 over 1943. With the completion of the big-inch lines and a return to more and more normal tanker transportation the need for economy in the use of all grades

(Continued on page 254)



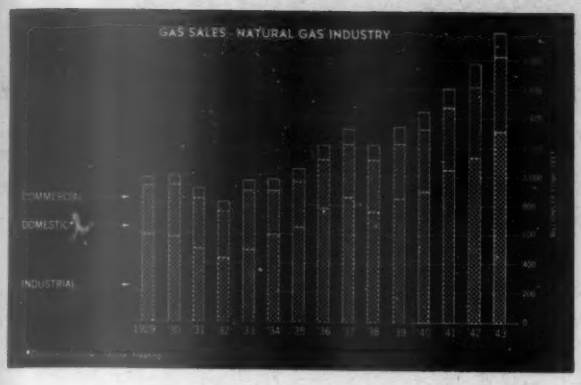
	(Barrels)*
1944	1,800,000,000
1943	1,637,000,000
1942	1,530,000,000
1941	1,580,000,000
1940	1,457,000,000

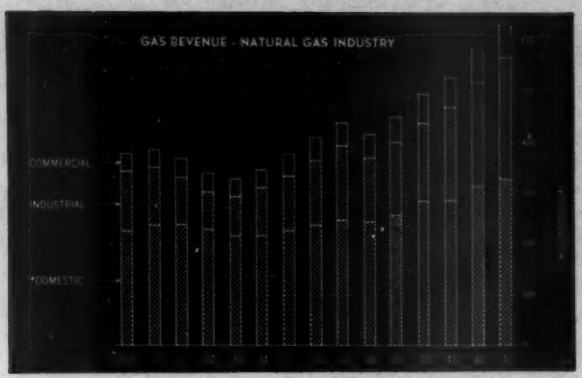
*Estimates with exception of 1940 which is Bureau of Mines figure.



	(Barrels)
1944	*725,000,000
1943	623,000,000
1942	624,200,000
1941	694,600,000
1940	614,900,000

*Estimate.





Comparison of consumption volume and dollar revenue in natural-gas industry

Natural Gas Continues Increase With Another Demand Record in Prospect

THE steadily expanding natural-gas industry which has approximately doubled the volume of its sales in the past decade, established a new high in 1943 when sales reached 1,983,487,000,000 cu. ft. according to preliminary estimates of the statistical department of the American Gas Association. This was an increase of 215,673,000,000 cu. ft. over the 1942 total, the previous all-time high. The size of the increase experienced in 1943 was also a record.

Principal factor in the 1943 increase was the gain in industrial and electric-power generation sales which rose 15.4 per cent against an industry-wide increase of 12.2 per cent. Since a proportionate expansion in industrial activity is improbable in 1944, it is doubtful if this year will witness as large an increase as that which developed in 1943. However, the momentum of the gains experienced in that year alone is sufficient to insure an appreciable rise in 1944.

The past year also marked other important developments in the industry. These included the federal authorization of the construction of needed pipe lines, one industry activity that had been virtually halted by the war. Most important of these was the proposed 1,200-mile line of the Tennessee Gas & Transmission Co. from Texas to West Virginia. However, agitation to convert the incomplete 20-in. petroleum products line from Texas to the East Coast has since developed. This development posed a threat which, early this month, appeared as though it might result in abandonment of the other project.

Other proposed lines which received federal authorization were the 26-in., 231-mile line of Cities Service Transportation & Chemical Co., designed to increase supplies in Kansas and Missouri, and the 20-in. 120-mile line of East Ohio Gas Co. which will tie in existing facilities and provide connections for delivery of 50,000,000 cu. ft. of gas per day from the Texas Panhandle to the Cleveland, Ohio, industrial area.

These projects were undertaken, solely in the case of the East Ohio tie-in and partially in the case of the Tennessee Gas & Transmission line, to supplement dwindling supplies in the eastern Ohio and western Pennsylvania industrial area. Ohio and Pennsylvania, are, respectively, the third and fifth largest natural-gas-consuming states. For years these states have been supplied entirely from the Appalachian area, but the increase in demand coupled with the decline in supply have made it necessary to restrict consumption and supplement supplies.

Another important development of 1943 was the action taken by companies engaged in natural-gas production, transmission and distribution which were affected by Securities and Exchange Commission regulations. Outstanding among these was the formation of Consolidated Natural Gas Co. through which the five natural-gas subsidiaries of Standard Oil Co. (New Jersey) were divorced from the parent company and combined as a single operating unit. The SEC required that Standard of New Jersey divest itself of its natural-gas subsidiaries or become subject to regulations of the commission affecting holding companies. Formation of Consolidated resulted in the largest integrated unit in the industry, operating chiefly in the eastern states.

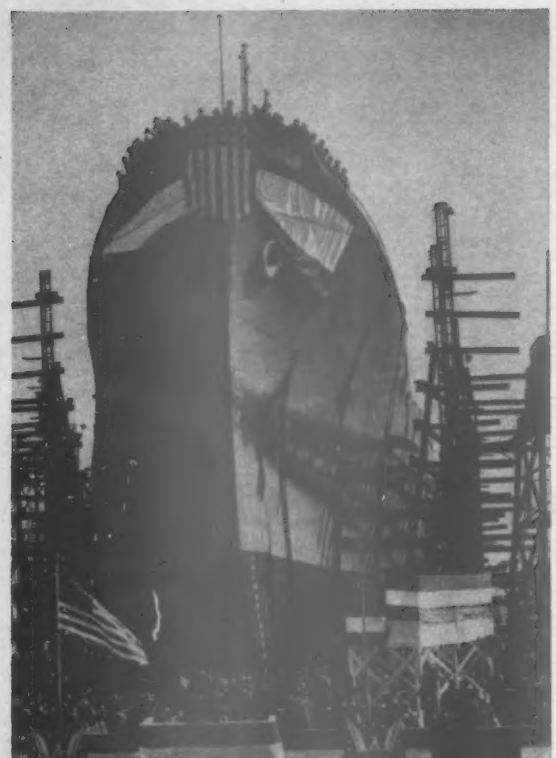
Increased appreciation of the value of natural gas was another development of 1943. This was due partially to the weakening of this country's petroleum position which resulted in a re-evaluation of the potentialities of natural gas. Reserves of the latter have been estimated at three-quarters of the proven petroleum reserves on a weight basis. Processes for the conversion of gases to liquid hydrocarbons are already available so that natural gas is in a position to supplement petroleum as a source of motor fuels if necessary.

Alkylation and polymerization are available for converting the heavier natural-gas hydrocarbons while methane, the lightest and largest, in volume, constituent of natural gas, may be converted by the Fischer-Tropsch hydrogenation process, now a most important source of motor fuel in Germany. Natural gas also has become a source of plastics and solvents. Chemical plants employing gas as a raw material have been enlarged or completed in the past year. Much of this development is shrouded in wartime secrecy but it offers a potentially profitable field for exploitation in a role not commonly associated with the industry.

Indications are that the total production of natural gas in 1943, including amounts used in the manufacture of carbon black and for field purposes, will reach approximately 3¼ trillion cubic feet.

Completed 252— 300 More Coming

by J. P. O'Donnell



One of the 167 high-speed emergency tankers launched in 1943. Eighty-five tankers of other types swelled the fleet additions to 252 for the year, a worthy start on an even more ambitious program in 1944

UNITED STATES shipyards built four times as many tankers in 1943 as they did in 1942 and in doing so established a record which, 12 months ago, appeared impossible in the light of the rate of construction prevailing then. During the 12 months ended December 31, 1943, United States shipyards delivered a total of 252 tankers which compares with 62 for 1942. The 1943 deliveries included 167 standard tankers of either private company or Maritime Commission design, 57 converted Liberty ships and 28 coastal tankers.

A year ago it was predicted that 271 tankers would be completed in 1943, a rate of better than five a week. Since completions in 1942 averaged only five a month, this objective seemed almost fantastic. However, the total for last year fell less than 7 per cent short of the objective, an attainment which, in the light of circumstances that existed a year ago, is outstanding.

Liberty Ships Converted

In order to meet the pressing demand for oil-carrying vessels, the Maritime Commission program was expanded by the conversion of a number of Liberty ships. According to the original plan, 102 Liberty ships were to be converted to tankers and 57, more than half the scheduled total, were completed last year.

The magnitude of the 1943 construction program is revealed by a comparison of the number and tonnage of tankers completed then with the prewar United States fleet. The United States tanker fleet on January 1, 1941, according to the Maritime Commission, consisted of 349 vessels of 2,000 or more gross tons, aggregating 2,578,440 gross tons (roughly 3,870,000 deadweight tons). The aggregate deadweight tonnage of the 252 vessels delivered last year is estimated at 3,400,000 tons. Launchings in 1943 were, therefore, equivalent, numerically, to 75 per cent, and, in tonnage, to more than 85 per cent, of the fleet as it existed on January 1, 1941.

At start of 1944, an even more ambitious building program was in prospect. Nearly 300 tankers were scheduled to be completed before January 1, 1945, almost 20 per cent more than were delivered last year. It was questionable, however, whether or not this program will be completed. The over-all tanker situation improved tremendously in the latter part of last year with the result that one large order was converted from tankers to Victory ships. This contract, with Kaiser Co., Inc., called for the construction of 48 tankers and its cancellation removed that number of such vessels from the 1944 program.

If the war in Europe is concluded in 1944 as predicted, it is possible that even the remaining tanker program will be scaled down considerably. Therefore, though present indications are that this year will witness another record-breaking tanker-construction total, fulfillment of those indications is uncertain.

1943 TANKER CONSTRUCTION

Month	Standard	Converted	Coastal	Total
January	5	0	0	5
February	9	0	0	9
March	12	0	0	12
April	13	0	3	16
May	15	0	1	16
June	11	0	3	14
July	15	0	1	16
August	16	0	6	22
September	14	8	7	29
October	16	19	5	40
November	19	17	1	37
December	22	13	1	36
1943 Totals	167	57	28	252

Tanker Routes Opened

Factors which have contributed mostly to the improvement in the tanker situation are the virtual elimination of the submarine menace and the reopening of shorter routes. It is impossible to evaluate these factors completely and accurately but it is obvious that they have resulted in a much easier situation. One example is the opening of the Mediterranean which is making possible the economic use of middle eastern oil. This has, for instance, reduced the distance from Abadan to London more than 40 per cent. Another example is the seizure of the Gilbert Islands in the South Pacific. By straightening out the West Coast-Southwest Pacific route, a saving equivalent to the use of five tankers is reported.

One of the best indications of the improvement in the tanker situation is the substantial reduction in surcharges which were put into effect during the past year. Another is available in the records of oil producing countries which are also larger exporters. Colombia's production in October, 1942, averaged just over 6,000 bbl. per day. In October, 1943, it was 55,000 bbl. per day, nine times the total of a year earlier. Venezuela, where production was well under 400,000 bbl. per day in late 1942, is expected to reach 1,000,000 bbl. per day in 1944.

Upward Pressure of Aviation Program Evident in Crude-Oil Runs to Stills

by H. Stanley Norman

THE unprecedented rise in refinery operations, pushing crude-oil requirements to an all-time peak of 3,912,420 bbl. daily during 1943, a gain of 7 per cent, was overshadowed by unrivaled construction activity which embraced 96 major 100-octane plants, butadiene facilities and conversion programs at more than 100 active refineries.

Costs of the 100-octane and the petroleum industry's butadiene plants exceed $1,550,000,000. Nearly half of the 100-octane program remains to be completed this year although much of the plant-completion schedule is packed into the first 3 months, leaving about 30 per cent of the total to be finished later in 1944. There is no assurance, however, that the current program will be wholly adequate and it is possible that additional projects will be required before the war ends.

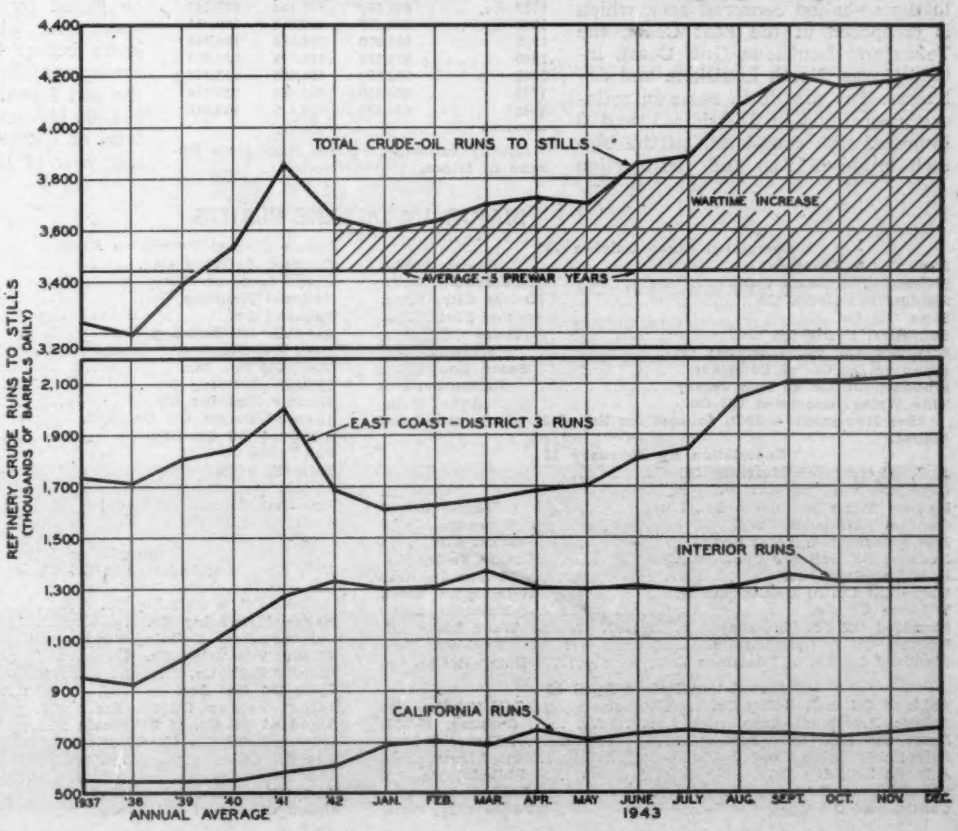
Approximately $900,000,000 of the refinery-construction program, started in 1942, accelerated in 1943 and scheduled for completion in 1944 is applied to 100-octane plants. The oil industry's end of the synthetic-rubber program, consisting of butadiene manufacturing facilities, was virtually completed at the end of 1943 and represents outlay by the government and private companies of roughly $650,000,000. Individual installations for production of 100-octane gasoline range in cost from $1,000,000 to $65,000,000 with a majority falling between $5,000,000 and $10,000,000.

At the start of 1944, there were 42 major 100-octane plants completed in the Petroleum Administration for War program which was revised upward several times during the early part of last year. Construction work on 12 of the 52 plants remaining to be completed is scheduled to be finished by February 15. Twenty-four others will be completed by April 15 and the remaining 15 units will be on stream before end of this year. Included in the total of 95 major plants programmed are 3 in the Netherlands West Indies, and 2 in Canada, bringing the domestic total down to 90. The lists of 100-octane plants include only major installations, such as catalytic cracking or alkylations units. More than 160 refiners, both large and small, have contributed one or several components to the aviation-gasoline program.

In reporting on the 100-octane program, PAW emphasizes that completion of a plant does not mean that it will be on production the next day, and that trial runs for the detection and exclusion of "bugs" frequently require several weeks.

The impact of wartime demand hit the petroleum industry with full force last midyear and sent manufacturing operations to new records, closing the year with crude-oil runs to stills at the highest daily average in history.

Two particularly significant conclusions are obvious from the charted trends of refinery operations: (1) Catalytic cracking operations and other facilities for production of military fuels are profligate of crude oil, and (2) the big-inch crude-oil line and other emergency transportation fa-



Charted runs of crude oil to stills show how emphasis has swung sharply to eastern and southern refineries and the general impact of war for larger volumes of military products

cilities have permitted the East Coast plants to resume their prewar importance in the petroleum industry's manufacturing operations.

Estimates made a year ago that domestic refineries would be compelled to average a minimum of 3,800,000 bbl. daily in crude-oil runs to stills proved conservative. Preliminary A.P.I. figures for November and December and Bureau of Mines data for the first 10 months indicate that crude-oil runs to stills during 1943 average approximately 3,912,500 bbl. daily and current operations are substantially higher, hitting a recent peak of more than 4,450,000 bbl. daily. Future refinery requirements depend to a major extent on duration of the war in Europe although this year's manufacturing program of all plant operators is based on the assumption that crude-oil and product requirements will continue upward at a rate somewhat reduced from that prevailing between last May and September. Crude-oil runs to stills increased from a daily average of 3,709,838 bbl. in May to 4,202,934 bbl. in September, a gain of more than 13 per cent in the intervening 4 months. Operations during the final quarter were more nearly stabilized, although part of the reason why the curve flattened out is because of shortages of crude oil at interior refineries.

Approximately two-thirds of the increase of 274,350 bbl. in the daily average runs to stills in 1943 accrued to the so-called censored area which is composed of the East Coast, the Texas and Louisiana Gulf Coast, inland Texas, North Louisiana and Arkansas. The drastic increase in refinery operations in Districts 1 and 3 indicates that completion of the big-inch crude-oil line and construction of aviation-gasoline manufacturing facilities exerted approximately equal influence. Military security considerations prevent a more detailed breakdown of the operations in the eastern and southern parts of the country. The increase of nearly 93,000 bbl. daily average refinery operations for 1943 in California was a rise of 14.7 per cent over 1942 compared with the gain of 10.7 per cent in the censored area. The decline of more than 1 per cent in the interior area, consisting of the Appalachian district; Indiana, Illinois and Kentucky; Oklahoma, Kansas and Missouri and the Rocky Mountain states, emphasized the influence of crude supplies on manufacturing operations.

Furthermore, the decline in refinery runs at inland plants pointed up the influence of military authorities and other war agencies in maintaining maximum manufacturing operations at coastal plants for speediest possible transport of petroleum products to the European and Pacific zones of combat.

It is evident from 1943 operating data that interior refiners whose throughput lacked approximately 200,000 bbl. daily of equallying capacity, must obtain new sources of crude oil and attain a more closely coordinated position with war manufacturing schedules if they follow the upward trend of other districts. Part of the moderate decline reported in operations of interior refineries is chargeable to the Appalachian area where shortages of crude oil have reached a critical stage. The situation, however, is hardly less critical at some of the Mid-Continent and Middle West plants although partial relief will be realized next April when Stanolind Pipe Line Co.'s 16-in. line is completed from West Texas to southern Oklahoma.

District 2 refiners were diligent in seeking federal reimbursement for tank-car movement of West Texas crude oil into the Middle West, pending completion of the Stanolind and Magnolia Pipe Line Co. lines from West Texas. An appeal was filed earlier this month with Washington authorities for removal of limitations in the proposed reimbursement plan which, in its original form, prohibited payment of tank-car transportation costs in excess of pipe-line tariff to any company in the excess profits bracket. The relief sought, refiners contend, would permit shipment of 75,000 bbl. of West Texas crude oil into District 2 during the next 3 months and thereby cushion the crimp of short supplies until the new pipe lines are completed.

Impact of the war on crude-oil requirements of domestic refineries may be gaged by a comparison of 1943 operations with the average for 5 years before this country became a combatant. Average runs to stills in the last 5 years of peace were 1,257,954,000 bbl. annually against the 1943 total of 1,428,032,000 bbl., an increase last year of 13 per cent.

ANNUAL CRUDE-OIL RUNS

(Thousands of barrels)

Year—	Censored area	Interior	California
1937	631,163	340,132	203,145
1938	626,427	338,254	200,334
1939	665,070	374,116	198,654
1940	674,185	419,075	201,023
1941	730,603	465,456	213,133
1942	808,310	485,403	230,164
1943*	884,595	479,419	284,018

*Partly estimated. Other data from Bureau of Mines.

MAJOR 100-OCTANE PLANTS

Completed Since October 28*

Lago Oil & Transport Co.	Aruba, N.W.I.
Mohawk Petroleum Corp.	Bakersfield, Calif.
Phillips Petroleum Co.	Kansas City, Kans.
Pure Oil Co.	Smiths Bluff, Tex.
Southport Petroleum Co.	Texas City, Tex.
Standard Oil Co. (Indiana) (2)	Whiting, Ind.
Standard Oil Co. of Louisiana	Baton Rouge, La.
Standard Oil Co. of New Jersey	Baltimore, Md.
Tide Water Associated Oil Co.	Avon, Calif.

*See November 4, 1943, Journal for list of 32 plants completed earlier.

Completion by February 15

J. S. Abercrombie-Harrison Oil Co.	Sweeny, Tex.
Champlin Refining Co.	Enid, Okla.
Eastern States Petroleum Co., Inc.	Houston, Tex.
General Petroleum Corp.	Torrance, Calif.
Pan American Refining Corp.	Texas City, Tex.
Premier Oil Refining Co.	Cotton Valley, La.
Root Petroleum Co.	El Dorado, Ark.
Union Oil Co. of California	Wilmington, Calif.
Wilshire Oil Co.	Norwalk, Calif.
Standard Oil Co. (Indiana)	Wood River, Ill.
Humble Oil & Refining Co.	Baytown, Tex.
Standard Oil Co. of Louisiana	Baton Rouge, La.

Completion Before April 15

Ashland Oil & Refining Co.	Catlettsburg, Ky.
Asiatic Petroleum Corp.	Curacao, N.W.I.
Associated Refineries, Inc.	Duncan, Okla.
Atlantic Refining Co.	Atreco, Tex.
Atlantic Refining Co.	Philadelphia, Pa.
Cities Service Refining Co.	Lake Charles, La.
Continental Oil Co.	Ponca City, Okla.
Crown Central Petroleum Corp.	Houston, Tex.
Frontier Refining Co.	Cheyenne, Wyo.
Great Southern Corp.	Corpus Christi, Tex.
National Refining Co.	Coffeyville, Kans.
Pennzoil Co.	Oil City, Pa.
Republic Oil Refining Co.	Texas City, Tex.
Shell Oil Co., Inc.	Montreal, Canada
Shell Oil Co., Inc.	Wood River, Ill.
Sinclair Refining Co.	Corpus Christi, Tex.
Sinclair Refining Co.	Sinclair, Wyo.
Socony-Vacuum Oil Co., Inc.	East St. Louis, Ill.
Standard Oil Co. (Ohio)	Cleveland, Ohio
The Texas Co.	Port Arthur, Tex.
Utah Oil Refining Co.	Salt Lake City, Utah
Asiatic Petroleum Corp.	Curacao, N.W.I.
Standard Oil Co. (Indiana)	Whiting, Ind.
Shell Oil Co., Inc.	Wilmington, Calif.

Completion Later In 1944

J. S. Abercrombie-Harrison Oil Co.	Sweeny, Tex.
General Petroleum Corp.	Torrance, Calif.
Humble Oil & Refining Co.	Baytown, Tex.
National Refining Co.	Coffeyville, Kans.
Pan American Refining Corp.	Texas City, Tex.
Phillips Petroleum Co. (2)	Borger, Tex.
Richfield Oil Co.	Wilmington, Calif.
Shell Oil Co., Inc.	Wood River, Ill.
Socony-Vacuum Oil Co., Inc.	Paulsboro, N. J.
Standard Oil Co. of California	Richmond, Calif.
Standard Oil Co. (Indiana)	Wood River, Ill.
Sun Oil Co.	Marcus Hook, Pa.
The Texas Co.	Wilmington, Calif.
Tide Water Associated Oil Co.	Bayonne, N. J.
Union Oil Co. of California	Wilmington, Calif.

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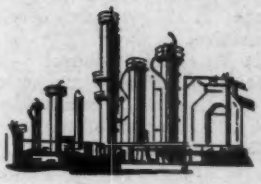

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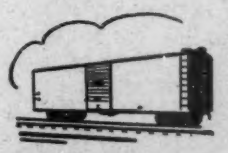

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Davies, Ralph K., deputy	6654	3831
Brown, Bruce K., assistant	6643	3433
Marshall, J. H., assistant	6515	3112
Frey, John W., assistant	7424	4272
Levy, Adolph, assistant	7514	4838

Production Division

Knowlton, D. R., director	7410	4231
Schilthuis, R. J., assistant	7416	2907
Heston, J. E., production	7418	2505
Hawthorne, R. G., materials	7419	2062

Refining Division

Cumming, E. D., director	5257	3233
Cragin, R. B., aviation	5256	2105

Transportation Division

Wilson, G. A., director	5408	4898
Sears, D. P., pipe line	5043	4833

Natural Gas-Natural Gasoline

Pew, J. E., director	7314	4736
Ducker, R. W., natural gas	7314	2059
Lange, W. R., production	5325	4744
Thacher, J. H., Jr., technician	7042	4840

Foreign Division

Heroy, W. B., production	7455	4454
Crampton, W. B., supply	2753	4788
Snodgrass, C. S., refining	2745	4789

Research Division

Swanson, E. B., director	7315	649
Lockwood, C. D., assistant	7317	4777

Construction Division

Miller, Max B.	3312	4560

Materials Division

Watts, F. A., director	1444	4585

Program Division

Coleman, S. P., director	4211	3457
Deegan, C. J.	4223	2745

Organizational Planning

Fish, L. S., director	6623	4813

Facility Security

Jergins, A. A., director	5213	4172

Marketing Division

Hochuli, Walter, director	4257	4646

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Butler, P. J., acting director of refining.
Epps, F. A., facility security.
Butterworth, E. M., special foreign representative.
Roberts, L. V., district counsel.
Harper, John, director of marketing.
Nash, D. D., director of construction.
Dinges, R. M., director of materials.
Naden, Wm., director of refining.
Wylie, J. R., Jr., director of production.
Cleaveland, E. H., research representative.
Torborg, G. R., acting director of transportation.
Miller, G. D., administrative officer.

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Horigan, W. M., marketing.
Hyde, R. S., natural gas and natural gasoline.
Fuellhart, H. W., production.
Stocking, H. E., district geologist.

District 2

Blum Building, 624 Michigan Ave., Chicago, 5, Ill. Phone Wabash 9040.

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Denton, P. D., assistant to director.
Rouse, J. E., construction.
Bullock, E. J., facility security.
Hughes, E. L., director of marketing.
Holland, L. B., director of materials.
Wonderly, F. C., acting district counsel.
Kelly, R. B., director of production.
Alberding, C. H., director of refining.
Bond, P. J., director of supply and transportation.
Geade, A. W., office manager.

Subdistrict 2 Office

410 Beacon Building, 406 South Boulder Ave., Tulsa, 3. Phone 4-9181.

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Patton, M. S., director natural gas and natural gasoline.
Collins, G. J., facility security.
Swab, J. F., natural gas and natural gasoline.

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245 Mellie Esperson Building, P.O. Box 2584, Houston, 1, Tex. Phone Charter 4-4731.

Averill, W. M., director in charge.
Sturges, D. P., director of construction.
Earhart, Kraus, director of facility security.
Cornell, D. E., district counsel.
Hardwicke, R. E., special counsel.
Dorgan, E. J., Jr., director of marketing.
Naylor, C. E., director of materials.
Brown, H. M., director of natural gas and natural gasoline.
Moore, Adrian, director of production.
Carruthers, R. L., assistant director of production.
Granger, Gordon T., director of refining.
Leyendecker, Harry, acting director of transportation.
Kilgarlin, Juanita L., office manager.

District 4

320 First National Bank Building, Denver 2, Colo. Phone Cherry 7476.

Foley, M. J., director in charge and director of production and transportation.
Markey, E. A., director of refining.
Ballard, A. M., director of natural gas and natural gasoline.
Rapp, H. T., director of marketing.
Schuyler, J. B., director of materials.
Fenshaw, J. R., district geologist.
Novak, A. R., office manager.

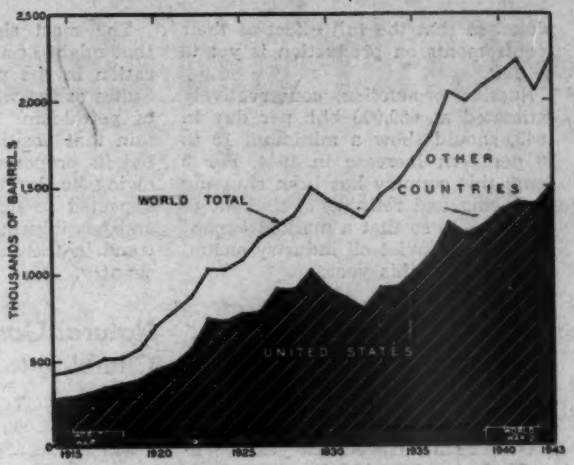
District 5

855 Subway Terminal Building, 417 South Hill St., Los Angeles 13, Calif. Phone Mutual 5331.

Gallagher, H. R., director in charge.
Vander Leck, Lawrence, director of production.
Prussing, G. F., director of construction.
Youker, M. P., director of refining.
Heise, A. R., director of facility security.
Thomas, Clyde, district counsel.
Reichert, C. T., director of materials.
Reynolds, K. L., director of natural gas and natural gasoline.
Fleming, Lewis, director of transportation.
Garretson, C. B., director of marketing.
Dolan, C. H., office manager.

World Production Will Set Another Record This Year

by J. P. O'Donnell



United States rise pushes world crude-oil production to new peak

PRODUCTION of crude oil throughout the world established a new record in 1943 but it is one that possibly will be short-lived. Present indications are that production in 1944 will exceed that of last year by at least 10 per cent and may go beyond 2,500,000,000 bbl. for the first time in the industry's history.

Production in 1943 is estimated at 2,248,405,000 bbl., an increase of 197,454,000 over 1942, and 21,280,000 above the previous record of 2,227,125,000 bbl. set in 1941.

The rise in production anticipated in 1944 is linked closely to the war demand. Military and naval requirements have tended to offset the curtailment in civilian demands which are subjected to virtually world-wide rationing. However, in the event of a cessation of war in Europe, military demand would be greatly reduced and it is doubtful if civilian requirements, though released from rationing, could take up the slack.

Because of war demands, production has continued to rise at about the same rate that has been maintained, with the exception of the depression era, since World War 1 began. Since the depression, however, the rise has been accelerated. From 1932 to 1939, the first war year, production rose at the rate of more than 100,000,000 bbl. annually. From 1939 to 1943, the rate of increase was only about 42,500,000 bbl. Thus, while war demands have been credited with imposing an almost impossible burden on the industry, actually an even greater load would have been incurred if civilian demand had continued the average rise of the 7 years preceding the war.

The trend of world production over the past 30 years is illustrated in the accompanying chart. It is apparent from this chart that had the rate of rise from 1932 to 1939 been continued, production in 1943 would have been above 2,500,000,000 bbl. or more than 10 per cent greater than actual output last year. This chart also compares the status of world oil production in World Wars I and II. During the former it averaged 460,000,000 bbl. annually in comparison to 2,150,000,000 bbl. in the current war which is approximately five times greater than in the first World War era.

Prospects for 1944 are that production will be increased in almost all oil-producing nations. Major gains are anticipated in the United States, Venezuela, U.S.S.R., Colombia and Iran. The first two may increase their daily average rates as much as 300,000 to 500,000 bbl., Russia's may be up 100,000 bbl., Colombia's 30,000, and Iran's 50,000 bbl.

Venezuela, Colombia and Iran are expected to show large gains as a result of the vast improvement in the shipping situation. All of these countries are major exporters of petroleum and the increasing availability of tankers will enable them to expand their exports. All have production potentials in excess of their present rates and these potentials will be improved in 1944 as the result of development campaigns already scheduled for each of them.

Even though United States resources are under a strain, a further increase in production in this country is necessary to maintain war products refineries at capacity operation. Many of the largest aviation gasoline units have just been or soon will be com-

pleted so that the full effect of their requirements on production is yet to be felt.

Russian production, conservatively estimated at 650,000 bbl. per day in 1943, should show a minimum 15 to 20 per cent increase in 1944. For 2 years this country has been shipping producing and refining equipment to the U.S.S.R. so that a marked expansion of the Soviet oil industry should be witnessed this year.

Gains Expected Elsewhere

Relatively smaller gains are expected in other countries. Mexican production, which averaged approximately 95,000 bbl. per day in 1943, should go well above 100,000 bbl. in 1944 and may exceed last year's rate by 20,000 to 30,000 bbl. Saudi Arabia's rate of production should be substantially higher to supply the recently enlarged capacity of the Bahrein Island refinery. Production in Iraq may increase but it is limited by the capacity of the pipe-line outlets and therefore will vary little from its near-capacity rate of 1943.

One area where a production decline is possible is central Europe. This probability will become a reality if retreating German armies follow a scorched earth policy in Rumania and Hungary and destroy the oil properties in central Europe's principal producing countries.

The most significant development that might occur in 1944 is a modification in the position of the United States as the world's largest producer of petroleum. This country will retain that position by a large margin but its proportion of the world total, owing to large gains elsewhere, is expected to decline to some degree and possibly inaugurate a downward trend in the ranking position of this country.

Natural Gasoline Output Climbing to New Records

WASHINGTON, D. C.—An all-time high of 256,000 bbl. daily of natural gasoline and allied hydrocarbon products, used in making high-octane aviation gasolines, was produced by U.S. natural gasoline and cycling plants last November, the latest month for which figures are available.

This was the third consecutive month that the natural gasoline industry broke all previous records. In October 1943, the plants produced an average of 252,700 bbl. daily of natural gasoline and allied hydrocarbon products. In September 1943 production averaged 250,000 bbl. daily.

"The natural gasoline industry is doing an excellent job," Administrator Harold L. Ickes said. "Setting new production records means that more and more of these valuable light hydrocarbon liquids can be used for the manufacture of high-octane aviation gasoline to meet the rapidly increasing demands as the United Nations step up their mass air attacks against the enemy."

Allied hydrocarbon products include condensate, liquefied petroleum gases, and isobutane. During November, the industry also set a record production of 13,700 bbl. daily of commercially pure isobutane.

Condensate is used primarily as a base stock for high-octane aviation gasolines. Isobutane is combined with butylenes to form isooctane alkylate, an essential ingredient of 100-octane gasoline.

Arkansas Louisiana to Drill Wells for Carthage Plant

MARSHALL, Tex.—Arkansas Louisiana Gas Co., which is about half through with construction of an absorption-type gasoline plant 9 miles northeast of Carthage, Tex., is reported to be planning to drill three, possibly more, wells in the Carthage field of Panola County. The new plant will have a capacity of 25,000,000 cu. ft. of gas daily.

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Enigma of Crude-Oil Supply Only Threat To Industry's War Machinery

by Henry D. Ralph

WASHINGTON, D. C. — The end of the second year of the war found the petroleum industry well geared to its tremendous assignment of fueling the fighting machines of the United Nations but threatened with a problem it had not faced for two decades—a possible shortage of crude supply.

Filling the ever-mounting but always uncertain military demands for regular and special products and at the same time meeting the minimum essential civilian needs of the domestic economy required the closest sort of cooperation within the industry and with the Government. This was accomplished through the same agencies that took over the job the day of Pearl Harbor, the Petroleum Administration for War with its regional industry committees and the Petroleum Industry War Council with its broad topical committees. Through this arrangement the oil industry operated somewhat like one big company at times and virtually under government control at all times. The inevitable frictions were kept to a minimum or settled "within the family" so that oil again presented an outstanding example of government-industry wartime teamwork.

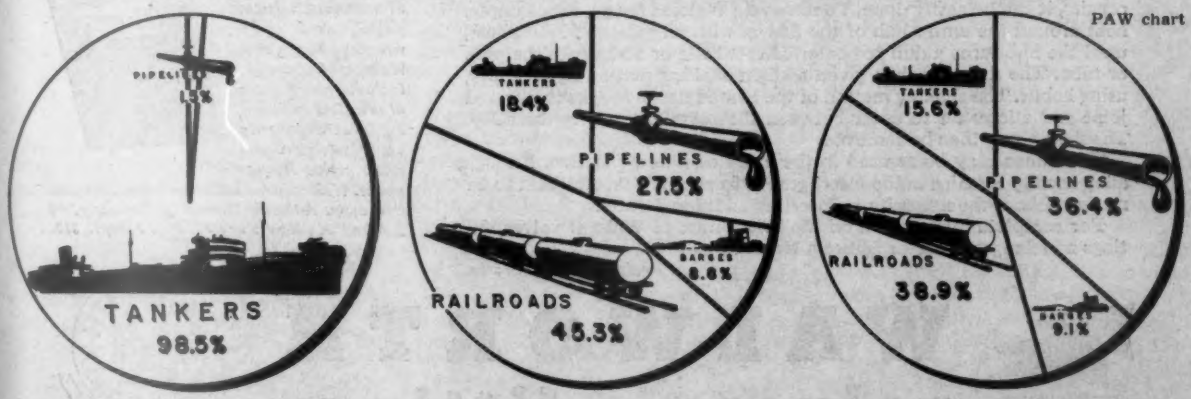
During 1943 the oil industry virtually completed its major rearrangements required for a long war, with the conspicuous exception of finding sufficient new crude to maintain reserves. Its domestic transportation system, completely disrupted by loss of tankers from coastwise runs, was reconstructed with pipe lines, rail, barge and truck routes so that all parts of the country were kept supplied with minimum essential requirements. Crude production and refining capacity were maintained and increased. Crude supplies and retail markets were pooled and allocated to serve war needs. A huge construction program of specialized plants to produce high-octane aviation gasoline and butadiene for synthetic rubber was virtually completed. Special petroleum products were turned out on short notice to meet Army and Navy requirements, and all military needs for petroleum products of any kind were filled. All this, and more, was accomplished in the face of a continuing shortage of materials, and an increasing deficiency of manpower in all categories.

With its war job now well in hand, the oil industry is beginning to look ahead toward the end of the war and the problems of reconversion to peacetime operations that will confront it then. When Germany collapses the tremendous demand for petroleum for the European theater of operations will fall to amounts required for supplying British industry and rehabilitation, relief, and military policing of the Continent. Opening the Atlantic to unescorted merchant shipping will make it much easier to supply these needs, and those of South America, either from the United States or other sources, so the situation on the East Coast of the United States should be much easier provided the crude supply is sufficient. But with military action concentrated in the Pacific, the West Coast will be drained of oil to an even greater extent than at present, and much Gulf Coast oil may have to be routed to the Pacific fronts via tankers. Thus, the oil industry may be faced with a complete set of new

This roundup of industry relations with Government during the second full year of war indicates the probable trends during remaining phases of the conflict and directs attention to the preliminary considerations given to postwar problems. If predictions of ending the European phase of the war this year are realized, the primary problem will be another broad adjustment of supply and transportation to concentrate facilities toward the Pacific theater.

Transformation From Peacetime to Wartime Transportation to District 1

PAW chart



PEACETIME 1940 | NOVEMBER 1, 1943 | COMPLETION OF ALL PROJECTS-APRIL 1, 1944

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problems when the fighting shifts entirely to the other side of the globe.

Postwar problems of the oil industry barely reached the discussion stage during 1943, but many of them were shaping up for active consideration during the coming year. Among these are disposition of government-owned pipe lines, tankers, refineries, and other facilities; discontinuance of government controls of all kinds; unscrambling of markets, supply sources and facilities which were pooled or allocated by direction during the war; extent of government control over or participation in foreign oil activities; restoration of normal competitive relationships among individual companies; application of the antitrust laws to the industry during the period when it is attempting to shake off its wartime controls, practices and habits; potential markets for high-octane gasoline, butadiene, and other totally new products of petroleum chemistry and refinery technology.

Production

FOR the producing end of the industry, 1943 marked the end of a long period of comfortable reserves and the beginning of what appeared to be an acute shortage of crude. Month by month the Government increased its recommended production rate, and the industry was hard pressed to meet these requirements.

During the early part of the year many producers maintained that the chief obstacles to greater production were arbitrary drilling regulations and limitations on the use of materials. Use of materials in drilling was governed by WPB Order M-68, which was later supplanted by PAW Petroleum Administrative Order 11, both of which limited drilling and well spacing in proven fields. PAW consistently maintained that the only reason for this was to obtain the greatest number of barrels of oil per ton of steel used in drilling and production. During the year, the oil industry received larger allotments of steel from WPB, and little by little the spacing regulations were relaxed and drilling restrictions were liberalized. While PAW stuck to its position that it must drive hard bargains in "trading steel for oil," by the end of the year the industry was not complaining much about the restrictions and there were few claims that substantial fields could be produced more rapidly and efficiently if all restrictions on materials were removed.

PAW contended, without serious contradiction, that by the end of the year all known oil fields were producing at their maximum efficient rate of withdrawal except those which lacked adequate transportation outlets. These were principally West Texas and northern Wyoming, and during 1943 PAW authorized the construction of two pipe lines from each of these areas to refining centers capable of handling the additional supply.

Drilling in Proven Areas

While holding down drilling in proven areas to a balance between materials supply and optimum production rate, PAW encouraged drilling designed to discover new fields and extend old ones. No restrictions were placed on the use of materials in wildcatting (except in the required distance from known producers), and assistance was given in recruiting manpower for new drilling. Wildcatting equalled previous high levels, though it fell below the PAW goal. The character of new discoveries was disappointingly low.

The greatest deterrent to more production was the low price of crude. This was agreed on unanimously by the oil industry, by PAW, and by every congressional committee which studied the subject. But the OPA thought differently, and it had the power.

The argument raged through the entire year, with no results except a few relatively minor increases in price in certain local areas. Crude prices had been "frozen" at levels prevailing in the fall of 1941, and OPA insisted that it "hold the line" on all basic commodity prices and withstood all demands for an oil-price increase. At the request of OPA, the Tariff Commission made a detailed report of prices of producing crude as compared with earlier years, which settled nothing because it admittedly did not consider costs of exploration and developing new fields. PIWC, after a lengthy study, requested PAW to apply to OPA for an increase of 25 cents per barrel in crude prices. PAW studied the request for several weeks and then requested an increase of 35 cents per barrel. Eventually this was denied by OPA. PAW restudied the matter and asked a reconsideration. OPA held the matter a while and denied it again. Then PAW appealed to the Office of Economic Stabilization, which gathered a mass of material and finally released a lengthy decision denying any over-all price increase but directing PAW to work out some other sort of "incentive" to exploration, secondary recovery, and continued operation of marginal wells.

Throughout all these negotiations the oil industry unanimously opposed any "subsidy," and contended that nothing but a straight crude-price increase would have the desired effect of maintaining production and of stimulating discoveries. Nevertheless, PAW began a study of possible "noninflationary incentives," but was unable to develop any program.

The industry then took the price matter into politics. For months a bill had been pending in the House of Representatives to require OPA to fix higher ceiling prices on crude petroleum and refined products, but it had received no action from the committee on banking and currency. A petition to discharge this committee quickly obtained the necessary signatures and the bill was called up on the floor of the House, passed by a substantial majority, and sent to the Senate just before the year-end recess.

Government owned oil lands were a subject of some controversy during the year. Producers in western states complained bitterly about restrictions on leasing and operations on the public lands, contending that the Department of the Interior was putting many artificial obstacles in the way of producing more oil from the public domain. Although supported by the governors and congressional delegations of several western states, these operators were unable to secure a liberalization of the leasing regulations.

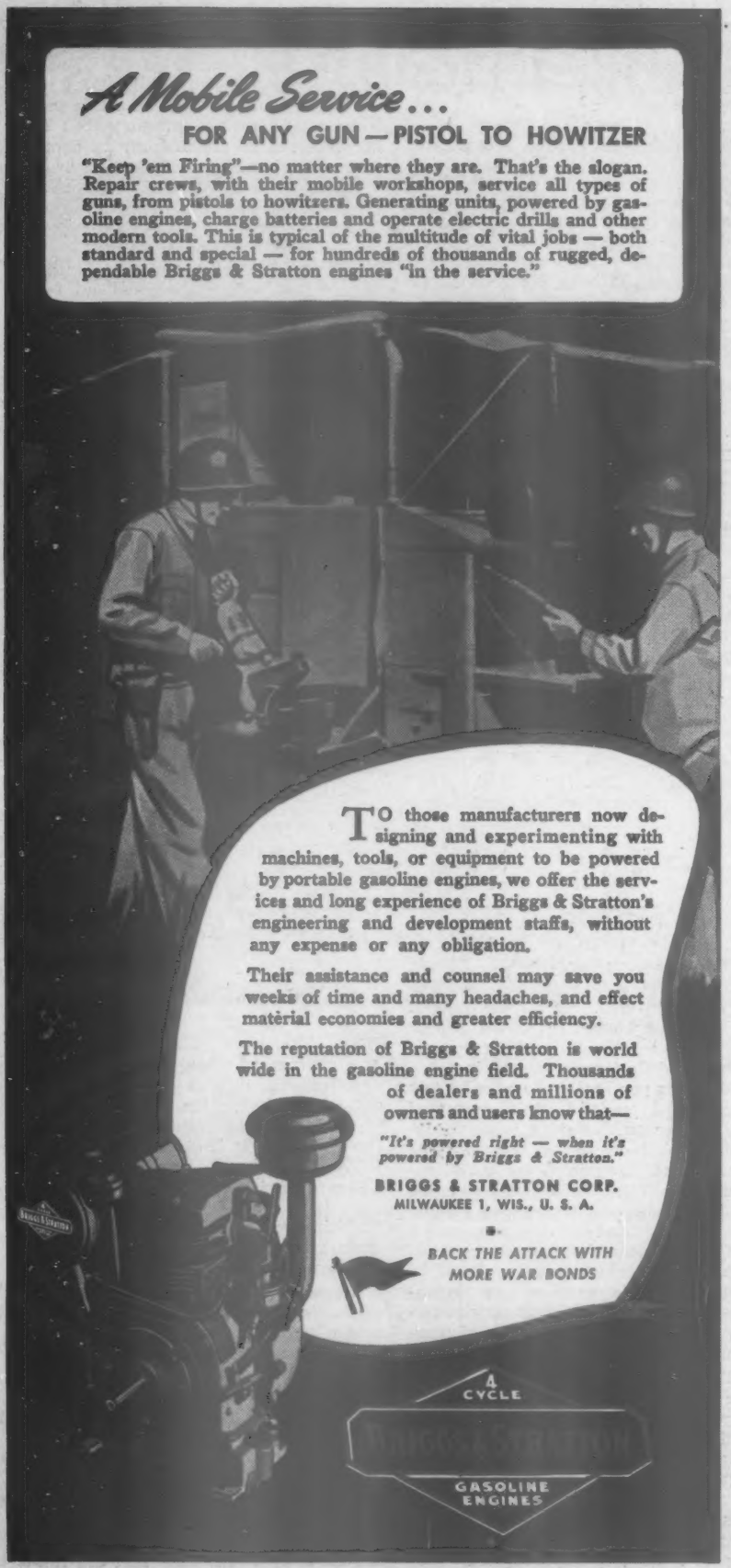
The potential shortage of crude oil induced Congress to accede to a request of the Bureau of Mines to authorize the construction of a number of semicommercial pilot plants to experiment with the production of liquid fuels from coal, shale, and other materials. The oil industry watched this legislation with interest and questioned its need, but did not oppose. While the project was authorized, Congress did not appropriate any funds during 1943 to begin actual work on such experiments.

Relations With Government

THE industry's relations with the Government were, on the whole, excellent throughout the year. The outstanding exception was the matter of crude-oil prices, and on this issue the Government itself was split with PAW supporting an increase and the Office of Price Administration, supported by the Office of Economic Stabilization, holding crude prices to their prewar levels with only a few relatively minor exceptions.

Congress kept a close watch on the oil industry throughout the year, and authorized an unusually large number of committee investigations. Without exception, these committees concluded that the oil industry was conducting its wartime assignment with vigor and intelligence and no major criticisms were raised.

Most of the industry's relationships with the Government were, of course, through PAW, the personnel of which continued to be drawn chiefly from the industry itself. This fact did not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automatically eliminate all friction, but it did result in preventing any serious deadlocks. There are many times when large sections of the industry violently oppose plans of PAW but these differences of opinion seldom reach the point of recommendation that the form of government supervision be changed. In fact, the industry generally favored giving more power to PAW, and considered itself better off than many other industries in the matter of necessary war regulation.

In addition to price control, there remained several other aspects of relationships with the Government in which the industry felt PAW should have more authority. One was the matter of military demand. In spite of repeated requests, the industry was never able to secure either directly or through PAW adequate estimates of the volume of various petroleum products which the Army and Navy expected to call on it to deliver at any given time or place, and this situation greatly handicapped planning operations.

Government control over materials remained a serious problem throughout the year, and while PAW never gained full control from the War Production Board it did receive a considerable delegation of authority. This, plus a slight easing in total supplies, caused the materials problem to become progressively less acute as the year wore on. Manpower was another field in which PAW had no authority, but it was able to assist the industry in wage adjustments and occupational deferment procedures.

Transportation

THE greatest pipe-line construction activity in the country's history took place in 1943, virtually all of it for the single purpose of moving oil eastward to replace prewar coastwise tanker service. A good part of the program was projected, and some of it constructed, during 1942, and some parts carried over into 1944, but there is little likelihood that 1943 will soon be equalled in oil pipe-line construction. Most spectacular was the completion of the big-inch line from Texas to New York Harbor, and its extensive feeder system in Texas. Of equal importance was the 20-in. products line along the same route, plans for which caused much controversy within the industry. At one time the plan for this line was almost abandoned, or drastically revised, by opposition from Mid-Continent refiners who feared a loss of markets to Texas, but careful forecasts demonstrated that Mid-Continent refiners would shortly have more demands than they could supply with crude available to them, and steel was obtained to push

the line all the way through to the East Coast in a single project. The close of the year saw most of the pipe-line projects either in operation or well along to completion except four which were authorized late in the year — two crude lines in West Texas and two in Wyoming.

The shortage of tank cars remained chronic throughout 1943, but the industry became more or less adjusted to the necessary changes in supply sources and routes, and to pooling of tank cars and terminal facilities. The Government's barge-construction program lagged behind original ambitious plans, and most of the contracts for wooden and concrete oil barges were cancelled, but an important number of steel barges and towboats were put into service on inland rivers and coastal waterways which contributed considerably to the total movement of oil eastward. Trucks for the oil industry also remained a scarce article, and the war production program did not permit the manufacture of many new tank trucks and trailers. Attempts were made to insure production of sufficient repair parts and replacements to maintain the industry's fleet in operating condition, and also to allocate sufficient heavy-duty tires, but conditions at the end of the year were not promising for any expansion in highway haulage of petroleum products.

Refining

THE manufacturing branch of the industry entered 1943 faced with staggering tasks of producing materials it had never before made in any quantity—high-octane aviation gasoline of new and difficult standards, butadiene for synthetic rubber, and special motor gasoline, fuel oil, diesel oil, and lubricants of military specification. The demand had been acute and growing through all of the preceding year, but had been met chiefly by improvised refinery conversions. The year 1943 saw the engineering and construction of dozens of large new refineries of totally novel types, specifically designed to produce these war products but largely adaptable to a variety of uses after the war. Most of this construction was financed by the industry itself, though government money went into a good many of the new plants. Many of these plants were completed and went on stream before the end of the year and work was well under way on the balance of what the refining industry believed would be virtually the total of its wartime expansion. While future military demands remained a secret, the refining branch of the industry ended 1943 with a pretty definite knowledge of just what types of products would be required and how much additional capacity would be constructed.

The expansion of refining capacity would have proceeded even faster had it not been for a shortage of construction materials and the allied shortages of manpower and shop fabrication facilities. The same types of components went into aviation-gasoline plants, synthetic-rubber plants, merchant ships, naval vessels, and other urgently needed war programs and facilities. WPB, which had the job of allocating materials and setting construction schedules, found itself in the middle of bitter interagency fights and congressional investigations. Charges were made that the rubber program was interfering with the 100-octane program, and vice versa, and that both were delaying the escort-vessel program, and so on. WPB eventually solved the problem more or less to the satisfaction of all and without apparent injury to the war by cutting back some programs, giving higher priority ratings to others, and, most importantly, perfecting a better system of scheduling the fabrication and delivery of common critical component parts and items. By the end of the year the over-all supply of steel and other critical materials had been increased and many war construction programs had been completed or curtailed so that there was relatively firm assurance that the remaining portions of

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EXCLUSIVE Columbian construction features PLUS easy assembly PLUS long-life service PLUS dependable protection for your stored crude — These are the extra value features you get in every Columbian Bolted Steel Tank.

Columbian's skilled steel fabricating engineers build these famous tanks to meet the exacting requirements of the Armed Forces — as well as to meet every requirement of oil producers throughout the world. These tanks are available to oil producers now.

★ *Columbian continues to build for victory with a record that merited the Army-Navy "E" for outstanding achievement in war production.*

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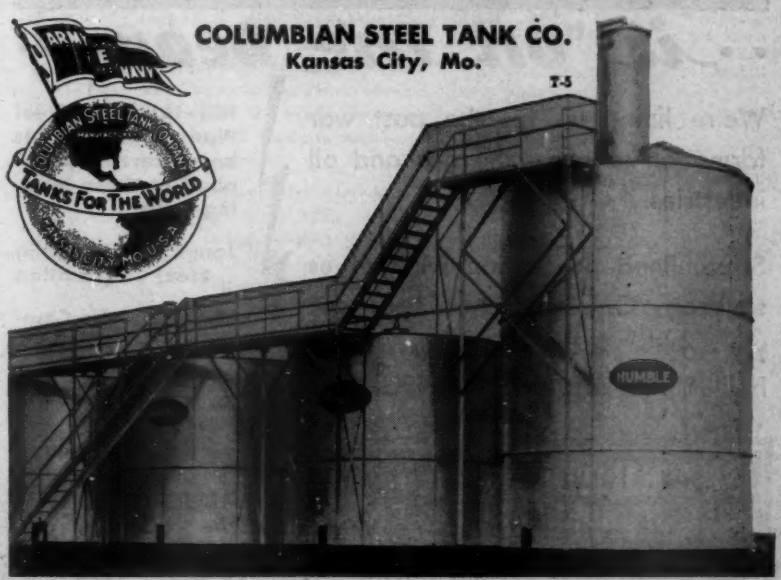

the 100-octane and butadiene construction programs would be completed on schedule.

At start of the year many refineries were unable to operate at capacity because of a shortage of transportation to bring them crude or remove their products, but as the months went by the nation's oil-transportation system was readjusted so that there was very little idle refining capacity, taking the nation as a whole, and a possible shortage of crude was one of the principal worries of refiners at the end of the year. Markets, either military or civilian, were available to absorb all the petroleum products that could be refined. However, this required strict control of the refining industry by PAW. Preference in crude supplies and transportation was given refineries producing petroleum war products, which meant an end of business as usual for many plants. This condition was felt particularly in District 2 during 1943. PAW found it necessary to pool the crude in this area and allocate it to war-products refineries on monthly quotas. This caused many complaints, but the method was felt necessary to porduce the maximum amount of war products, use transportation facilities most effectively, and maintain an equitable distribution of crude, supplies, and inventories.

Refinery yields of civilian products also had to be controlled by PAW. Early in the year there was a severe shortage of fuel oil, both heating and residual, so the output of motor gasoline was curtailed. By the following winter this situation had changed somewhat so that the relative demand for fuel oil (other than Navy grade) had lessened but the lighter gasoline fractions were required for military use. As a result, national gasoline rationing was imposed, and PAW was forced to put maximum limits on the octane rating of civilian gasoline.

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Materials

A SHORTAGE of materials plagued all branches of the oil industry throughout 1943, but gave some signs of easing up a bit by the year's end. In April the WPB put into effect its long-discussed Controlled Materials Plan, and PAW was made the "claimant agency" for the entire oil industry. Under this procedure PAW was allotted lump amounts of steel each quarter to divide among all oil operations. Concurrently PAW revised its basic materials control order, P-98-b. By means of this, and numerous revisions and refinements during the year, PAW was able to simplify and decentralize its control machinery, removing many of the complaints of earlier procedures. Also, WPB was able to allocate somewhat larger amounts of steel to the oil industry as the year progressed, and PAW instituted a plan for maintaining better inventories in field warehouses and supply depots, so that the overall materials situation was considerably better at the end of the year than at the beginning.

However, it was necessary for PAW to impose even stricter inventory control and to require that idle materials be redistributed within the oil industry before issuing priorities for new supplies.

Marketing

PETROLEUM marketing felt the war most severely in 1943 through the imposition of rationing. All during the previous year the consumption of gasoline had been curtailed by the restrictions on driving necessitated by the shortage of rubber, and in the East the shortage of oil transportation had necessitated rationing of both gasoline and fuel oil.

Twice during the first half of 1943 military demands for gasoline depleted East Coast stocks so greatly that a ban was put on "pleasuring driving," and gasoline rations were dras-

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MORE WELLS! . . . MORE OIL! REQUIRE MORE ELECTRIC POWER IN '44!

Our government asks for more wells and more oil in 1944—and, if we know the petroleum industry, they will "come through" one-hundred percent.

The Petroleum Industry knows, too, that the Utility Electric Power Industry will work shoulder to shoulder with them in every vital activity. So, our jobs are clearly defined, and through continued close cooperation we will give 'em plenty of gasoline, and plenty of oil, needed desperately both at home and on all fighting fronts.

Meanwhile, keep in mind that America's Electric Power strength is many times greater than ever in history—sufficient to meet any war emergency—any vital need.

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tically reduced. PAW announced that it proposed to "equalize" supply conditions throughout the country as soon as transportation conditions permitted, and during the summer nation-wide gasoline rationing was put on the basis of a shortage of gasoline rather than a shortage of rubber. This subjected the rest of the country to driving restrictions almost as severe as those which had prevailed in the East, and the complaints were long and loud. Some oil men protested that there was no shortage of gasoline and would not be any in the oil-producing areas. In time, however, even the oil states became adjusted to these restrictions, and the position of PAW apparently was justified by year-end statistics indicating that the nation's stocks are at a near-record low.

Marketers got one small consolation out of the turn of war events in that a tight situation in coal, coupled with better supplies of fuel oil, made it possible for PAW to drop its campaign to induce or force fuel-oil consumers to convert to the use of coal. Those who had converted were not encouraged to return to the use of oil, but at least the shift was halted and the relative position of the two fuels was maintained in status quo.

Oil wins wars!

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Every barrel of precious oil you pump is a blow at the Axis! Don't let bottom water seepage stop it flowing for a single day. Be prepared with Eagle Lead Wool in your store room. It tamps easily into cracks and crevices around the bottom of the hole to make a solid, lasting, water-tight seal! Economical Eagle Lead Wool is rapidly installed in cartridge-shaped Eagle Wire Containers, sized to fit all casings. Safeguard against bottom water sabotage—order through your jobber today!

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These 3 Eagle Bearing Metals meet most requirements . . .

Eagle Dreadnaught — for extreme speed and pressure conditions

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Foreign

FOREIGN operations of the oil industry, as of most industries, remained almost a government monopoly throughout the year. All imports and exports, all tanker movements, all foreign production, refining, and marketing operations of United States oil companies were subjected to detailed supervision and control by the Government. PAW headed up this control, cooperating with the Army, Navy, War Shipping Administration, State Department, Lend-Lease Administration, and Board of Economic Warfare (later changed to Foreign Economic Administration). Deep military secrecy surrounded all these activities, and all that the public learned was that this country was supplying most of the petroleum needs of the United Nations, and that Latin American countries were being supplied with minimum essential requirements by means of a tanker pool.

This situation lead to something of a sensation late in the fall when five United States senators returned from a round-the-world military inspection tour and reported that the United States was supplying most of the oil used in the war while potential foreign sources of supply were not being used to capacity. Government officials countered with explanations that military conditions had made it impossible or impractical to utilize foreign course but that a program was already under way to develop more oil in the Middle East.

PRC Starts Turmoil

The nature of this program was never divulged, but enough leaked out, or was suspected, to cause great concern in the oil industry. Criticism centered around the Petroleum Reserves Corp., a government corporation empowered to produce and refine petroleum outside continental United States which had been quietly chartered in June but had lain dormant until activated late in the fall by Petroleum Administrator Ickes. PRC announced it was sending a delegation to the Middle East to investigate the oil situation there, and at the same time it became known that PRC was negotiating to purchase a stock interest in American oil companies operating abroad. No such purchase was ever announced, but the oil industry became alarmed at this and other evidences that the Government might go into the foreign oil business on the British pattern. PAW's own Foreign Operating Committee roundly denounced such a proposal and strongly advocated dependence on private enterprise, and Administrator Ickes was forced to tell PIWC that the administration had not yet adopted any foreign oil policy either for the duration or for the postwar period.

Markets Virtually Static

On this and other pages are the highlights of price changes authorized during 1943 on crude oil, refinery products and in tank-wagon markets. The rigid ceilings on crude-oil prices are reflected in similar static market conditions in petroleum products and through the sales structure to the service-station level.

WARTIME price-control regulations withstood another full year of vigorous assaults from the petroleum industry. Each rejection of recommendations for higher prices to bring this basic commodity within a more reasonable range of parity served to whet determination of the industry to pierce the artificial ceilings created by the Office of Price Administration. Despairing of relief from current ceilings which producers assert are hampering exploration, hastening abandonment of marginal wells and preventing resort to secondary-recovery operations, the industry turned to Congress for relief.

The Disney bill prohibiting the establishment of OPA ceilings on petroleum prices at less than 80 per cent of 1926 parity has passed the House and is pending action in the Senate. Unless the measure is attached to some favored administration bill, every recent utterance from the White House has indicated that it will be vetoed, assuming favorable action in the Senate.

Not nearly the unanimity exists in the industry on desirability of obtaining relief through legislation as was thrown behind the previous appeals for modification of price ceilings before the Office of Price Administration, the Office of Economic Stabilization and the Office of War Mobilization. A substantial segment of the industry contends that price fixing by Congress, even though current action is in the direction sought, threatens to establish an undesirable precedent.

Many Fear Precedent

Those counseling against the legislative route for relief assert that it will be just as simple for Congress to pass bills providing for lower prices at some later date and express grave fear that the sponsors of price legislation are on dangerous ground.

Equally positive in their arguments, however, are the proponents of the Disney bill. Without relief from current ceilings which are liquidating reserves at considerably less than the cost of finding new oil, the price legislation supporters believe nationalization of the industry is merely a matter of time. Their opinions are based on the conviction that if the industry fails to supply all petroleum required for the war program and essential civilian demand it will be charged with having failed to discharge a public trust. They point to the accelerated downward curve of newly discovered oil fields as abundant evidence that ability to supply all essential demand is rapidly disappearing.

Nevertheless, OPA, OES and OWM maintained a solid front against general advances throughout 1943 and the weighted average price for crude oil rose only about 3 cents per barrel. The 25-cent advance in California heavy-oil fields was the most substantial rise authorized during the year. The prime consideration, OPA admitted in modifying the ceiling on California crude oil with particularly desirable characteristics for manufacture of residual fuel, was to stimulate production on the Pacific Coast. Stocks of heavy fuel oil, an essential commodity in military operations in the Pacific, had undergone a continuous decline and threatened to reach acute levels at a time when current and prospective demand was rising steeply. The stimulant of higher prices brought immediate results. Completions rose promptly in the fields producing heavy crude and were sustained at the higher level throughout 1943.

OPA Continues Policy of Allowing Modest Rises in Subnormal Fields

CEILING prices for numerous fields were adjusted upward during 1943, continuing the OPA policy of granting individual increases rather than an over-all price rise.

Most of the increases were corrections bringing subnormal fields into line with comparable production. Moderate increases were granted in isolated instances to encourage secondary-recovery projects, because the quality of oil in relatively new fields justified a higher price, or to encourage development of fields. One increase was granted because producers were operating at a loss under existing ceilings.

In nearly all instances, the price increases were absorbed, by agreement and OPA direction, by the purchasers.

Higher ceiling prices at receiving tanks were announced January 28 in several Texas, Louisiana, Kentucky and Arkansas pools.

1. Rincon field, Texas, crude of 40 A.P.I. gravity increased from $1.32 to $1.45 a barrel.

2. McKamie, Dorcheat, Macedonia and Big Creek pools, Arkansas, maximum on sour distillate of 57 to 68 A.P.I. gravity, increased from $1.15 to $1.25 a barrel.

3. Olla, Little Creek, South Olla pools, Louisiana, maximum on crude of 40 A.P.I. gravity and above increased from $1.30 to $1.35 a barrel.

4. Shields field, Texas, maximum of $1.25 increased to $1.35 for crude of 40 A.P.I. gravity.

5. Sebree pool, Kentucky, increased from $1.25 to $1.32.

Wyoming

An increase of 15 cents a barrel in 20 fields producing Wyoming black crude was announced by OPA on February 27.

Tentative Prices Retroactive

Tentative prices set for crude oils at the well by buyer and seller were made retroactive, upon OPA approval, to the date of the agreement or to February 2, 1942, whichever is later. Prior to this ruling, effective March 30, 1943, approved tentative prices were only effective on later sales. The ruling provided that tentative prices could be set by either buyer or seller, when the ceiling cannot be established by a posted price or actual sale on October 1, 1941. OPA reserved the power to set a substitute price in lieu of a tentative price submitted for approval. Similar provisions were made for the tentative pricing of crude petroleum purchased at points other than the receiving tank.

Increases in California

Advances ranging up to 25 cents per barrel were made effective on March 26, 1943, in 20 California fields

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producing heavy crude petroleum, and these advances were extended to other heavy-oil fields in the state on April 12.

Plymouth and Elk Basin

An increase of 10 cents per barrel for crude produced in Plymouth pool, Illinois, and of 8 cents per barrel for black oils from the Elk Basin field, Wyoming, were authorized April 22. This put the ceiling at Plymouth at $1.15 a barrel, and at 90 cents per barrel at Elk Basin.

Mississippi, Texas and Oklahoma

Prices were increased 4 cents per barrel in North and North Central Texas and Tillman County, Oklahoma, bringing the ceiling to $1.25 per barrel for crude of 40 A.P.I. gravity and above. An increase of 11.44 cents per barrel in Tinsley field, Mississippi, bringing the ceiling to $1.18 per barrel for crude of 40 gravity and above, was also allowed on May 18, 1943.

Ville Platte

An increase of 10 cents a barrel at the receiving tank for crude petroleum produced in the Ville Platte field of Louisiana was allowed on May 22, 1943, bringing the ceiling to $1.30.

Aliso Canyon

Revision of maximum prices at the Aliso Canyon field, California, was effective June 7, 1943, placing this area on the same basis as other fields in California. The revision set 89 cents as maximum price for gravities from 15 to 21.9°; 91 cents for 22 to 22.9°; 95 cents for 23 to 23.9°; $1.02 for 25 to 25.9°; $1.05 for 26 to 26.9°.

Texas Panhandle

Maximum prices for Texas Panhandle crude oil were increased by 7 cents per barrel on June 16, 1943, lifting the basic ceiling to $1.22 at the receiving tank for crude of 40 gravity and above. The increase meant an additional return of $1,500,000 yearly to Panhandle producers.

Talco, Sulphur Bluff

Maximum price at the receiving tank for Talco and Sulphur Bluff fields, Texas, was increased May 28 to 80 to 92 cents per barrel for oil of below 20 gravity, between 20 and 25, and over 25.

Rulings

Effective July 14, OPA announced that differentials established in contracts with producers must be preserved when a specific maximum price is set for an individual area. Those with contracts in existence on October 1, 1942, or renewed thereafter, have the right to require payment of the same differentials.

New regulations for determining price ceilings for crude petroleum,

and petroleum and natural gas were issued August 13. No changes were made in the price structure, as established in Revised Price Schedule 88, but all sections dealing with ceilings were brought up to date and embodied in a new regulation, Maximum Price Regulation 436, dealing with crude petroleum, petroleum and natural gas. All maximum prices for specific fields previously announced are included in MPR 436.

Further Increases

Increases ranging from 5 to 12 cents per barrel were granted for all production in seven areas in Kentucky, including Big Sandy River, Sebree field, Belton field, Spottsville, Owensboro, Bowling Green and Butler County areas, effective August 19.

Also on August 19, an increase of 10 cents per barrel was granted for Woodsboro field, Texas.

The ceiling price of crude produced in the Pickens field, Mississippi, was raised 17½ cents a barrel on September 2.

Effective September 10, an increase of 10 cents per barrel was authorized for the Smart field, Arkansas.

Premium price of Franklin heavy-sand oil produced in Venango County, Pennsylvania, was increased 20 cents a barrel on October 4, bringing the ceiling to $3.63 a barrel.

Price Adjustments at Refineries

DISTILLATES and residual oils previously subject to price increases to cover higher transportation costs were redefined January 5, and the OPA maximum price schedule for petroleum and petroleum products was amended to include Bunker C and No. 6 fuel oil shipped by motor transport and tank cars when such transportation is used as a substitute for barges and tankers.

Maximum prices for Bunker C and No. 6 fuel oils were established for Texas and Louisiana ports including Mississippi River ports up to and including Baton Rouge at 85 cents a barrel. Specific prices per barrel were also established for Fall River, Mass., $1.65; Portsmouth, N. H., $1.65; New Haven, Conn., $1.65; Wilmington, N. C., $1.65; Pensacola, Fla., $1.15; Tampa, Fla., $1.50; Miami, Fla., $1.60; Mobile, Ala., $1.10.

New Price Structure

A new schedule of dollar and cents ceilings for industrial fuel oils refined in parts of Kansas, Arkansas, Louisiana, Oklahoma, New Mexico, and Texas went into effect January 25. The ceiling prices reflected an increase of from 5 to 8 per cent in some areas, but on the whole the higher prices were largely offset by savings in transportation, since the new schedule was designed to augment local production and to encourage the blending of low gravity residual oils with higher gravity fuels.

Pacific Standard Fuel Oils

Generally prevailing 1941 prices for Pacific Standard No. 300 and No. 400 heavy fuel oils became maximum dollars and cents ceilings for those products at refineries, effective February 1.

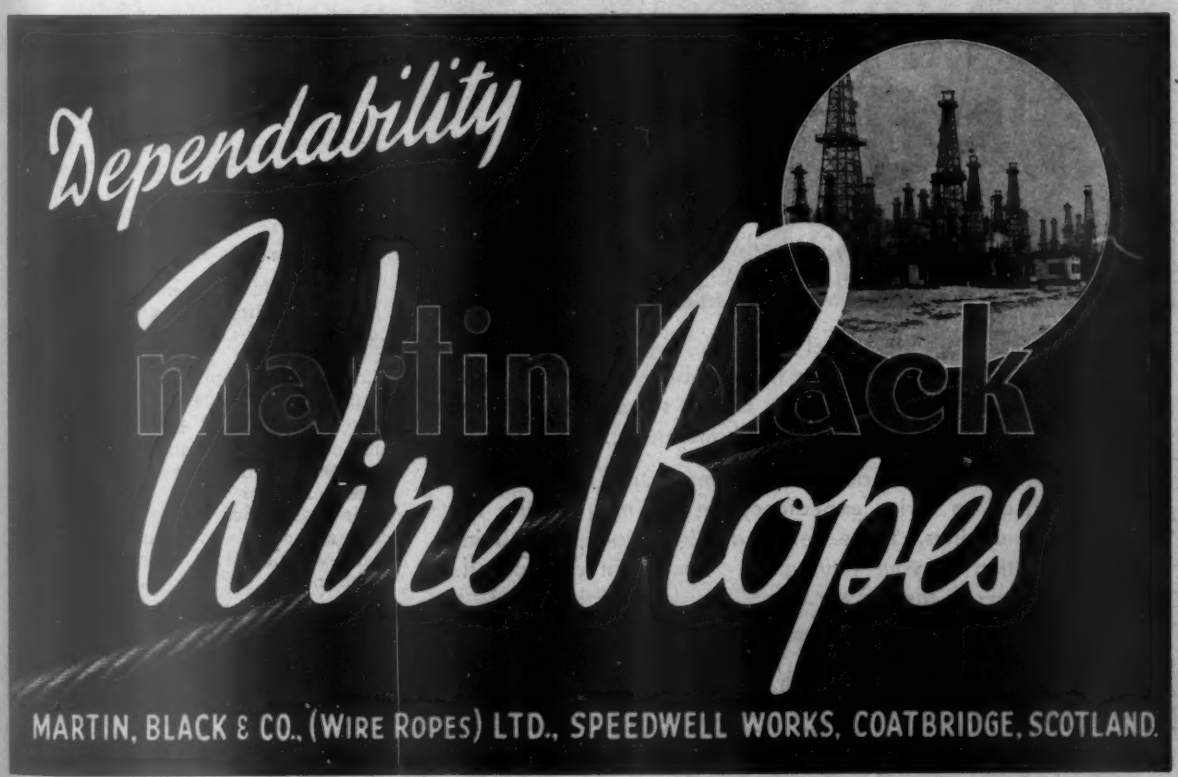
Territorial Sales

On May 22, OPA established specific cents per gallon prices on petroleum and petroleum products sold to Hawaii. The ceilings were based on a ruling that after that date maximum prices of commodities on export sales in the territories will not be controlled by the maximum export price regulation but be subject to the maximum prices under the regulation applicable on sales in the territories.

Maximum prices for No. 300 and No. 400 oil in the Los Angeles area were fixed at 95 and 85 cents, respectively; in the San Francisco Bay area at $1 and 90 cents, f.o.b. refinery, exclusive of taxes.

Distillate Diesel

Cents per gallon bulk-maximum prices were established March 1 for distillate diesel oil of 28 gravity and above at Mobile, Ala., and three Flor-



ida ports where generally prevailing prices had ranged from 4.25 to 4.75 cents per gallon. New price at Mobile was 4.625 per gallon, 4.75 at Pensacola, Panama City, Port St. Joe, Florida, effective March 1.

Blended Fuels Price Structure

New price structures and dollars-per-barrel maximums for blended fuels for all states east of the Rocky Mountains were established March 3. Prices were adjusted to encourage refineries to blend heavy and cheaper fuel oils with lighter and more costly distillates. This action compared to the January 25 action for the Middle West. At the same time, the OPA granted a 25 cent per barrel increase in maximum prices for heavy fuel oils and a graduated increase for heavy crudes on the Pacific Coast. Remaining western states were brought under the new structure April 1.

Fuel Oil Reductions

Ceilings on residual fuel oils of 20 gravity and over for refiners in Wyoming were reduced from 12 to 18 cents per barrel to a uniform level of $1.04 on July 20.

Montana Increase

Ceiling prices of residual fuel oil in eastern Montana were increased from 2 to 5 cents per barrel on September 2, the action granted to relieve refiners from hardships resulting from the previous price structure, and to compensate for the increase in ceiling prices for Wyoming black crude.

Bulk Lots

Bulk lots of gasoline, kerosene and distillate fuel oils shipped from specified midwestern points to the eastern seaboard went under specific cents per gallon ceilings on November 10.

Increases Revoked

Previous increases in price ceilings were revoked for f.o.b. refinery and terminal sales of gasoline and fuel oil in western West Virginia, Pennsylvania and New York for shipment to other parts of the eastern seaboard area. The action took place on December 1. Reductions were 1.2 cents a gallon on gasoline, 1.5 cents a gallon on kerosene and distillate fuel oil, and 30 cents a barrel on residual fuel oil. The earlier increases had been granted to compensate for higher transportation costs during the curtailment of tanker shipments.

Cents-Per-Gallon Ceilings, Texas

Cents-per-gallon maximum prices for gasoline and distillate fuel oils shipped from refineries in inland Texas and adjoining Arkansas and Louisiana counties were established December 2.

Tank-Wagon Adjustments

APPLICATION of base-period reference prices was broadened February 8 to include all tank-wagon sellers in the country. The action, incorporated in Revised Price Schedule 88, Amendment 66, primarily simplified the method of determining maximum prices, but also increased some retail and tank-wagon prices.

Dealers selling fuel oil and heating oils on commission from tank wagons were authorized to increase commission charges 0.3 cent per gallon in 20 eastern, southern and midwestern states, effective February 24. In effect, this allowed the commission distributor to retain the commission authorized on December 29, 1942, and which he had passed on to his oil supplier.

On August 26, a new system of adjusting ceilings frozen at subnormal levels for tank-wagon sellers of gasoline, kerosene and range or stove oil, distillate fuel, or tractor fuel in 11 middle western states was announced. Ceilings below normal prices now can be increased either by taking the reference seller's normal price as of October 1, 1941, or taking the reference seller's present ceiling price and adding to it 0.7 cent per gallon. The lower of the prices resulting from this adjustment is the new ceiling. One exception was made to this: If a tank-wagon seller's maximum price for tractor fuel is higher than the two alternatives, that maximum remained in effect.

Specific Prices, St. Louis

Maximum tank-wagon prices for range oil, stove oil and heater oil at bulk plants at St. Louis, Mo., and East St. Louis, Ill., and circuit points served by those plants were set at 8.9 cents per gallon for sales of less than 25 gal.; 8.3 cents for 25 to 99 gal., and 7.9 cents for 100 gal. or more.

Allowance to Large Consumers

Changes in commercial tank-wagon gasoline ceiling prices in New Jersey, Pennsylvania, Delaware, Maryland, Virginia and the District of Columbia took place during the fall. Summarized, these changes include:

Prior to August 1, 1943, the maximum price to a commercial consumer was the commercial consumer price of the reference seller (generally the principal seller in a state) or the seller's own commercial consumer tank-wagon price, whichever was higher.

The 0.75-cent allowance was tentatively suspended on September 11.

The conditions were modified on October 15. Consumers with 60,000-gal. semiannual requirements who had received a 0.75 cent or more allowance on March 1941 were allowed the maximum 0.75 cent discount.

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Revamped Transportation System in Position to Meet Emergency Conditions

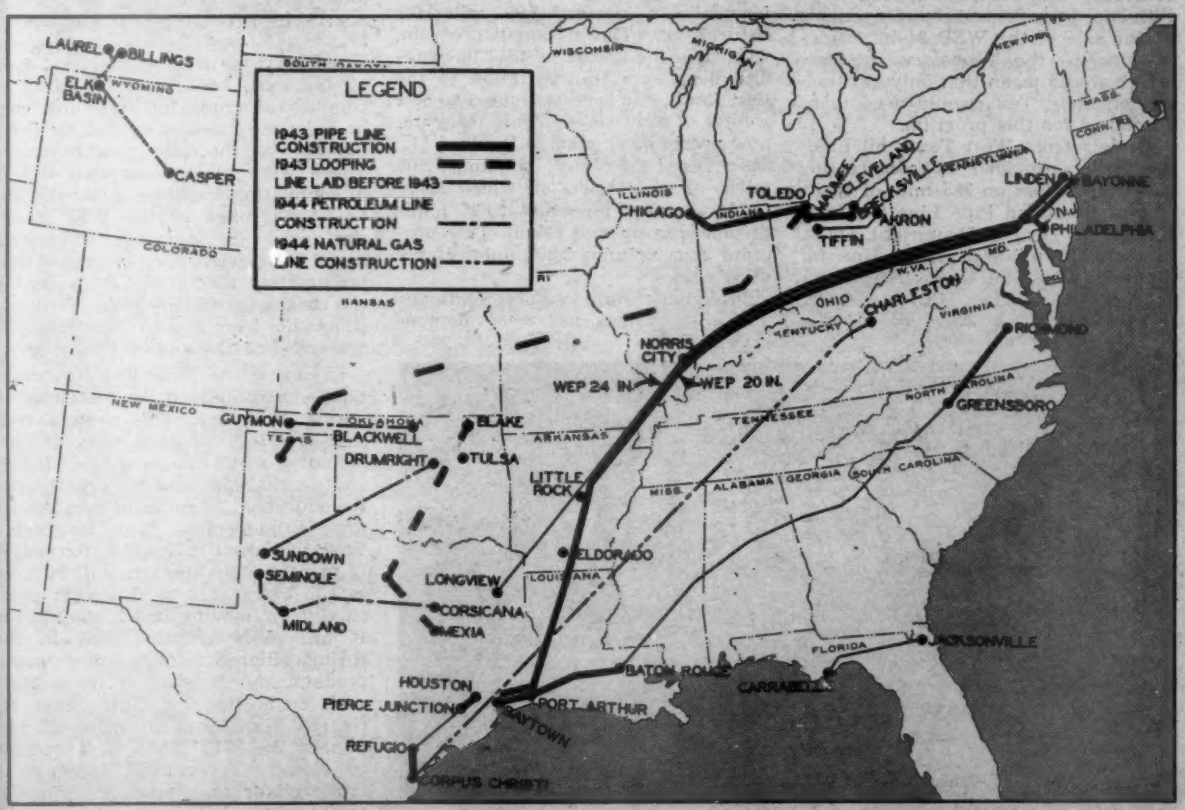
by Paul Reed

THE United States is beginning to reap advantages accruing from revamping of petroleum transportation which has been in progress for more than 18 months. The pipe line construction and transformation programs planned in critical times after Pearl Harbor are now more than 90 per cent completed. These changes, together with increased tanker movements from the Gulf Coast, have produced a strategic or logistic situation in marked contrast with that of a year ago when the second big-inch line from the Gulf to the East Coast was being planned and even a third line of this kind was considered desirable. At the beginning of 1944, which may be referred to later as the preinvasion period, the extensive provisions for petroleum transportation promise to be adequate to meet even the unpredictable demands which may come with expanding military operations.

"Upon completion of all projects now under construction in the spring of 1944," Harold L. Ickes, petroleum administrator, has stated, "the East Coast will have an overland capacity of about 1,625,000 bbl. a day, and sufficient transportation will be available throughout the country to distribute with only a minimum use of tankers, the total volume of petroleum that can at that time be produced within the United States to destinations where it will be required during 1944.

"However, United States production will not be enough during 1944 to meet indicated requirements and it will be necessary to use tankers for importation of additional petroleum. It is estimated that before the end of 1944 such imports will exceed prewar imports."

With the big-inch reaching capacity, according to Ralph K. Davies, deputy petroleum administrator, tank-car shipments to the East Coast have been reduced to 800,000 bbl. a day. Last July tank-car deliveries to the East Coast were 1,000,000 bbl. daily. The new schedule allows ODT to assign additional cars to the Southwest-to-Midwest and Southwest-to-California runs. Early in December 66,000 tank cars remained out of the 74,000 previously in East Coast service.



Status of pipe line construction is indicated by map showing most important lines laid in 1943 and their relation to certain previously built lines as well as petroleum and natural gas lines now under construction or definitely scheduled for 1944

With the increasing tanker movements from Gulf Coast ports which are likely to become more important as the year progresses, a new flexibility is promised to petroleum transportation which has led to discussion by the industry of possibilities of converting one of the WEP lines to natural-gas service during the second half of 1944. Although the prospects ahead are easier, petroleum transportation facilities are now being pushed to capacity operation. In the near future, more tankers are expected to return to Gulf-East Coast service because reduction of the submarine danger has made more tanker capacity available by eliminating the retarding effect of convoy movements as well as lowering losses by attack.

Winter Construction Program

During the winter months of 1943-44, work is in progress on 2,160 miles of line which will be completed in the spring or later. This is an unusually active winter construction situation.

The largest of these lines is the 1,200-mile 24-in. natural gas line from the Corpus Christi, Tex., area to connections with Consolidated Natural Gas Co. and Columbia Gas & Electric Co. in Kentucky and West Virginia. Tennessee Gas & Transmission Co. is laying this project along a route traversing Louisiana, Tennessee and Kentucky and does not appear to be influenced at present by proponents of the sale of the WEP 24-in. crude-oil line to the Tennessee company which would mean that only gas lines to Longview, Tex., would need to be furnished for this program.

Outlets from West Texas oil fields are being provided by construction now in progress on 385-mile of 16-in. line of Stanolind Pipe Line Co. from Slaughter, Tex., to Drumright, Okla., and on 335 miles of 12-in. line for Magnolia Pipe Line Co. from Midland, to Corsicana, Tex. Cities Service Transportation & Chemical Co. is laying 240 miles of 26-in. natural gas line from Guymon, Okla., in the Hugoton field, to the Blackwell, Okla., compressor station of Cities Service Gas Co.

Two lines are scheduled to be started this spring as outlets for the Elk Basin field in Wyoming. Stanolind Pipe Line Co. will build a 230-mile line of 8 and 10-in. pipe from the field to connect with its trunk line at Casper, Wyo. Yale Oil Pipe Line Co. will lay 6 and 8-in. pipe for an 83-mile system to move crude oil from the Elk Basin and Frannie fields on the Wyoming - Montana boundary to refineries at Billings and Laurel, Mont.

Although current predictions are conservative regarding the extent of 1944 pipe-line construction, the fact that nearly 2,500 miles of pipe is being laid or definitely scheduled is a substantial beginning for the year ahead. In reviewing past years it can be seen that most of the new pipe line work does not become apparent until the late spring or early summer. Frequently large projects are initiated in the fall. It is believed that considerable natural gas pipe-line construction has been postponed because oil lines have had first call on the restricted supplies of steel pipe. During 1943, an estimated total of 7,500 miles of pipe was laid, consisting of 3,000 miles for crude oil, 2,600 miles for products lines and 1,900 miles for natural gas. The national program, started in the spring of 1942 to expedite petroleum transportation to the East Coast, has been estimated to cost a total of $250,000,000. This program, now nearly completed, authorized 11,338 miles of pipe lines, including 7,600 miles of new lines, of which 4,774 miles are new pipe and 2,826 miles of pipe dug up and relaid. This program also includes 3,303 miles of reversed lines.

Interchangeability of petroleum and natural-gas lines has been demonstrated by experience of the last 2 years. Approximately 333 of 435 scheduled miles of natural gas lines have been converted to moving petroleum to meet emergency conditions. Texas Pipe Line Co. is reported to have a program for operating a line from the Texas Panhandle to move occasional shipments of crude oil. Ordinarily this line is in natural-gas service to which it was converted from its original status as a crude-oil line. Continental Oil Co. has been shipping crude oil and natural gas simultaneously through a line on the Gulf Coast.

Increases in shipments have been evident in all branches of petroleum transportation and natural-gas transmission. Daily tank-car movements to the East Coast increased from 5,000 bbl. in the spring of 1941 to 1,000,000 bbl. daily in July 1943. Petroleum pipe-line shipments to the East Coast went from 42,000 bbl. early in 1941 to 515,113 bbl. daily at the end of 1943. Inland barge shipments rose from 64,000 bbl. daily in April 1942 to 168,000 bbl. daily November 1, 1943.

Big-Inch Reaches Capacity

The biggest factor in petroleum pipe-line transportation was, as would be expected, the WEP 24-in. crude-oil line which began pumping into tank cars at Norris City, Ill., February 19, 1943. The big-inch was unable to function at full capacity for any length of time until the second half of the year because of insufficient supplies of crude oil and tank cars or because of delays caused by flood damage to the line and railroads. There were also unexpected delays in completing facilities. After the entire 1,464 miles of the WEP 24-in. line were in operation, shipments from Longview, Tex., averaged approximately 300,000 bbl. daily during the last quarter of 1943. Tank-car shipments from Norris City were discontinued at the end of November.

Laying of the WEP 20-in. products line was completed on December 8 within 225 days. This system consists of a total of 1,652 miles of line, including main line as well as feeder and distribution lines of various sizes. An additional 54 miles of 8-in. feeder line is being laid from Beaumont, Tex., to Lake Charles, La. According to present plans the line will be used in the early part of this year principally for moving No. 2 heating oil. It has been intended that in the spring, shipments of gasoline would predominate. Because of its location with connections at Gulf Coast refineries convenient to crude-oil terminals, the WEP 20-in. is adaptable to effective operation either as a crude oil or as a products line. Capacity of the line is considered to be 235,000 bbl. of products daily.

There is considerable discussion re-

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garding the future of the WEP 24-in. and 20-in. lines. Major companies desire to utilize the increasing number of available tankers because of their flexibility. Operating data obtained from the WEP 24-in. line indicate that it could compete with modern fast tankers and for this reason it has been predicted that if the line should continue in service under peacetime conditions it would have an effect on tanker rates.

Most of the crude-oil lines laid in 1943, excepting the WEP 24-in. extension, consisted of short loops and extensions. The largest looping program was that of Stanolind Pipe Line Co. which laid 198 miles of 8-in. and 12-in. in sections along the main line between Mexia, Tex., and Blake, Okla. Standard Oil Co. of Louisiana laid 109 miles of 8-in. and 10-in. between the Golden Meadows field and Baton Rouge, La. A 67-mile 12-in. line was laid for Empire Pipeline Co. connecting the Sour Lake, Tex., terminal of the Texas-Empire-Tidewater crude-oil line with the Cities Service Oil Co. refinery at Lake Charles, La.

Most of the 1943 products-line construction, outside of that for WEP, was for Sinclair Refining Co. and Plantation Pipe Line Co. operations.

Sinclair laid a 75-mile lateral from Shaefferstown, Pa., to Baltimore and Washington, D. C., which receives products transhipped from barges at Steubensville, Ohio, for movement eastward. Sinclair is also equipped to pump westward to Schaefferstown from its refinery at Marcus Hook, Pa. Sinclair is completing a 250-mile 8-in. products line from East Chicago, Ind., to Toledo, Ohio.

Lines serving as extensions at both ends of the Plantation system were provided by two organizations. Defense Plant Corp. financed construction of 179 miles of 8-in. from Greensboro, N. C., to Richmond, Va. Bayou Pipe Line System, a joint-ownership venture of six common carrier pipeline companies, built a system of 302 miles, including 251 miles of 8-in. and 10-in. of main line between Baytown, Tex., and Baton Rouge, La., and 51 miles of 4-in., 6-in. and 8-in. feeder lines. Salvage pipe was utilized for both extensions which came from old lines and oil wells. A large part of the Bayou station equipment was second-hand.

The most important program to be completed before end of last year was that for supplying Panhandle-Hugoton gas to East Ohio Gas Co., now merged in the new Consolidated Natural Gas Co. To accomplish this, East Ohio Gas Co. built a 120-mile 20-in. line from its system at Brecksville to the Panhandle Eastern Pipe Line Co. line at Maumee, Ohio. Panhandle Eastern built 328 miles of 24-in. and 26-in. loops and added compressor equipment to increase throughput to furnish East Ohio with 50,000,000 to 100,000,000 cu. ft. per day, most of which would go to underground and liquefied storage to carry peak loads during the winter.

In addition to the 2,500 miles of line already mentioned, which are in sight for the 1944 program, discussions in recent weeks indicate that another 250 miles of line may be started early in this year's construction season.

This forecast does not include other lines which may be planned for a number of situations of future potential importance. Natural gas from the Southwest may be transmitted to industrial areas in the Great Lakes region which are not yet supplied.

If imported oil is required for District 2 refineries, there may be considerable looping and revamping of established trunk lines. For moving imported oil one of the WEP lines may be utilized in such a way that new laterals would be required for distribution to refineries in the Great Lakes region.

It has also been predicted that the low cost of transportation through large-diameter lines may encourage greater use of such advantages where several lines of standard diameters were previously used.

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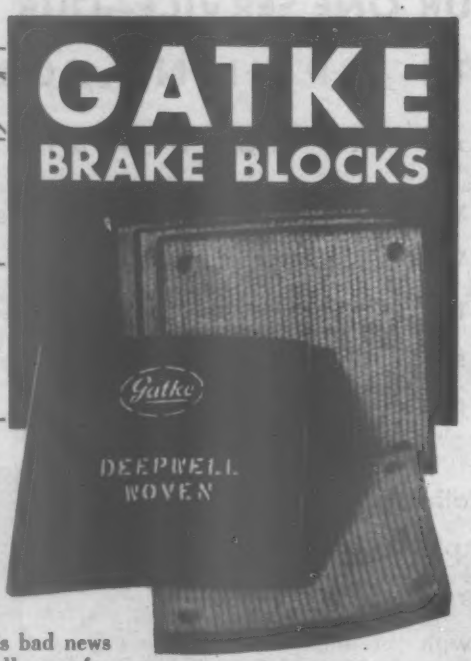

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Three Ellenburger Discoveries Focus West Texas Interest on Ordovician

by Harry F. Simons

FORT WORTH, Tex. — Three important Ellenburger discoveries, all in Winkler County and all completed within a 90-day interval, highlighted the year in West Texas and brought to fulfillment the prediction made a year ago that 1943 would give a good indication of the deeper-pay prospects in that area. There have been no additional wells completed in either of the three pools because of the time required to drill deep wells in the area approximately 7 months. Additional tests are currently under way in each of the new pools.

In the five Ordovician pools already producing at the start of 1943 there were 40 new wells completed. Embar-Ellenburger, Andrews County, had the highest number of completions with 16 new oil wells, each being approximately 8,000 ft. deep. Barnhart, in Reagan County, was second in Ellenburger completions with 13 oil wells, approximately 9,200 ft. deep. Other Ordovician pools receiving development were Apco-Warner in Pecos County with 12 wells, Abell in Pecos County with 8 wells, and Heiner in Pecos County with 1 well.

Generally, there was a tendency to project wildcat wells to the deeper horizons, if not to the Ordovician at least to basal Permian. Chief deterrent to Ordovician drilling has been cost of wells which is boosted considerably by the presence of chert in the Devonian formation in many localities. Wells can be drilled to basal Permian without too much difficulty and adding excessively to the costs.

PRODUCTION AND RESERVES—WEST TEXAS

(In thousands of barrels)

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Barnhart	240	357	18,153	25
Big Lake	1,791	99,998	29,302	183
Cedar Lake	465	1,041	12,559	53
Cowden-Foster	8,539	53,898	160,602	1,445
North Cowden	3,930	27,931	98,079	562
South Cowden	831	3,628	12,372	122
Emma	389	1,601	6,399	68
Foster	2,594	18,071	39,929	567
Johnson	815	2,677	13,823	126
Fullerton	329	442	33,858	25
Fuhrman-Mascho	492	4,604	23,836	130
Fuhrman and West	296	3,581	9,159	56
Mascho	133	140	13,860	60
Miscellaneous	63	883	817	14
Goldsmith-Harper	8,627	56,001	327,709	1,212
Goldsmith and North	7,421	46,662	278,458	978
Embar-West Andrews	692	853	19,247	49
Harper	514	8,496	30,004	185
Hendrick-Kermit	8,513	274,395	119,765	1,939
Eaves	207	912	2,988	10
Emperor	534	3,901	9,099	123
Halley	85	1,045	1,355	29
Henderson	1,630	7,954	22,546	140
Hendrick	2,083	206,428	26,572	279
Kermit	1,334	31,030	20,720	813
Keystone	1,753	11,309	23,631	373
Leck	140	4,045	1,455	9
Scarborough	441	7,382	5,388	128
Weiner	267	350	4,050	34
Wheeler	39	39	361	1
Howard-Glasscock	4,842	109,122	53,878	829
Iatan-Snyder	1,568	20,281	19,069	424
Iatan	1,343	17,732	17,268	324
Snyder	225	2,549	2,801	100
McCamey	3,881	64,120	46,300	946
McCamey	3,707	58,150	45,250	832
Crane-Cowden	149	5,551	949	99
Miscellaneous	25	419	101	15
McElroy	6,151	133,056	92,942	591
Mears	785	6,834	60,116	110
Pecos Valley district	2,706	12,777	66,022	649
Abell	1,630	2,055	36,945	106
Apco	322	586	13,214	37
Lehn	73	453	647	81
Pecos Valley	241	2,921	2,679	167
Payton	298	3,171	2,839	120
Shearer	158	1,389	1,631	43
Walker	344	750	5,250	71
Miscellaneous	153	1,472	2,836	55
Penwell-Jordan	3,411	37,348	129,162	528
Dune-Edwards	164	747	10,033	37
Jordon	1,571	7,409	33,991	225
Penwell	925	24,274	23,236	167
Waddell	751	4,918	61,892	89
Sand Hills	1,698	9,777	72,723	171
Seminole	2,858	8,215	101,785	300
Sharon Ridge	365	1,722	6,778	183
Slaughter	11,205	25,977	445,343	1,471
Taylor Link	589	8,285	7,565	133
Todd	81	282	918	14
Ward, North	2,809	29,328	60,542	506
Magnolia-Sealy and S.	459	1,723	14,277	72
North Ward-Monahans	2,358	27,476	44,284	423
Spencer	76	129	1,971	11
Ward, South	2,818	50,825	94,345	980
Estes-Dobbs	1,463	15,634	42,366	338
Shipley	487	6,184	23,986	132
South Ward	868	28,007	27,893	510
Wasson	12,584	54,350	399,200	1,455
Westbrook	222	9,629	2,771	97
Wheat	253	9,165	3,835	87
World	686	8,419	7,581	89
Yates	9,548	284,877	386,823	930
Crockett	91	451	1,649	38
		359	3,951	36
Tobarg	489	7,906	5,452	257
White and Baker	119	371	1,759	30
Yates	8,671	275,688	375,012	869
Miscellaneous	381	2,624	24,846	75
Total West Texas	98,637	1,377,751	2,807,229	15,555

PRODUCTION AND RESERVES—TEXAS PANHANDLE

(In thousands of barrels)

Carson County	4,742	47,782	87,605	331
Gray County	15,770	214,135	256,235	2,428
Hutchinson County	11,680	178,394	230,356	2,102
Moore County	148	5,499	3,421	14
Wheeler County	1,360	23,312	23,928	403
Total	33,700	469,213	599,545	5,678

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BRADEN STEEL BUILDINGS

Shallowest Ellenburger production in the Permian basin to date was found in a well in the northern part of Pecos County. The well is not yet an official completion although it has been flowing about 10 bbl. per hour on test for several weeks. It is Brice-McCandless 1-101 Atlantic Refining Co., Section 101, Block 11, H&GN Survey, 1 mile southeast of Owego. The well topped the Ellenburger at 4,005 ft., was drilled to 4,103 ft. and plugged back to 4,079 ft. After perforating with 69 shots and treating with 4,000 gal. of acid the well flowed. Another test ¾ mile away has been started and a pair of wildcats are under way as a result of this success.

The first Ordovician well completed in Winkler County was Magnolia Petroleum Co. 20 State-Wilson, Section 4, Block B-3, PSL, 5 miles north of Kermit on the east side of the old Kermit pool. It was completed May 18 and the pool was named the Kermit-Ellenburger. Ellenburger pay was topped at 10,673 ft. and the hole was drilled to 10,744 ft. The well flowed 601 bbl. of 41.7-gravity oil from the 32-ft. pay section. The hole was drilled deeper after being temporarily abandoned. Activity was resumed when the Amon G. Carter C-2 Walton provided information which caused a reappraisal of the area.

Carter C-2 Walton, Section 1, Block B-3, PSL Survey, topped Ellenburger pay at 9,495 and drilled to 9,655 ft., total depth. It showed for a good well while drilling operations were in progress, was officially completed on June 19, and tested 6,790 bbl. daily of 40.7-gravity oil.

Third Ellenburger Discovery

The third deep Ellenburger discovery was Stanolind Oil & Gas Co. and Shell Oil Co., Inc. 1 W. D. Blue, Section 15-46-1s, T&P Survey. The hole had been temporarily abandoned but after the other two Ellenburger discoveries were successfully completed work was resumed. Ellenburger pay was topped at 10,647 ft. and total depth was 10,697 ft. The well flowed 1,370 bbl. daily.

A new pay in the Keystone pool of Winkler County also attracted considerable attention. It was the Holt (Clear Fork) lime found in Richardson & Bass 4 J. B. Walton, Section 5, Block B-2, PSL Survey, ¾ mile southeast of Carter's Ellenburger discovery. The well flowed 251 bbl. of 39.4-gravity oil from pay topped at 4,680 ft.

The discovery of two new Clear Fork pools and the extension of the Fullerton pool in Andrews County and finding of Clear Fork production in the Russell pool of Gaines County were the other outstanding highlights in the district. The Russell pool was discovered by Shell Oil Co., Inc. 1 D. N. Leaverton, Section 458, Block G, GCSD&RGNG Survey, 5 miles southwest of the Wasson pool. The well pumped 213 bbl. of 35.2-gravity oil from Clear Fork lime pay at 7,487 ft. The pool was later extended ½ mile south.

Clabberhill pool in Andrews County was the second Clear Fork (Holt) lime pool discovered in the area during the year. Skelly Oil Co. 1-K University, Section 28, Block 9, University Survey, 2 miles east of the Emma pool, topped the pay at 5,464 ft. and was completed for a pumping potential of 177 bbl. of 33.3-gravity oil. A west offset is drilling.

Complete evaluation of the third Clear Fork discovery is currently impossible. It may be a new pool or it may be a 4-mile northwest extension of the Fullerton pool which produces from the same pay. Presently it is called the Union pool. The first well was Union Oil Co. (California) 1 J. D. Biles, Section 19, Block A-31, PSL Survey, which hit the Clear Fork pay at 7,431-41 ft. and flowed 460.43 bbl. of 41.9-gravity oil through ⅝-in. choke. It was completed August 30 and since then one additional well has been completed in the pool and there are three drilling.

The Fullerton pool (Clear Fork) was extended 2½ miles southeast by the Mid-Continent Petroleum Corp. 1-B University, Section 16, Block 13, University Survey. It made 179 bbl. from pay topped at 6,878 ft. A 1½-mile northeast extension was proven by C. U. Bay et al 1 Bitler and Lowe, Section 12, Block A-32, PSL Survey. These two extensions plus the 17 oil wells completed in the pool added 3,000 proven acres to the field.

Late in the year a brisk lease play through the middle of the Midland basin was set off by The Texas Co. 1 John Mabee, Section 37, Block 40, G&MMB&A Survey, southeastern Andrews County, which opened a new San Andres lime producing field. There are now four wells which have reached the producing depth, but none thus far has been officially completed although a pipe line is being laid to the field, all of which is owned by The Texas Co., and is on the ranch of John Mabee. A scramble for leases followed immediately after the showing in the first well, with large blocks being taken in Martin, Midland, Upton, Reagan, Dawson, and eastern Gaines counties, on the presumed existence of a parallel platform to the Central platform on which occur the fields farther west.

Possibility of a blanket Silurian producing horizon in the south part of the Permian basin was indicated by the Texas Pacific Coal & Oil Co. 52-A J. F. Lane, Section 5, GC&SF Survey, in the McCamey pool, Upton County. The hole was drilled to the Ellenburger at 8,358 ft. and had a show of oil. It was then plugged back to the Silurian zone at 7,125 to 7,200 ft. and completed for 398 bbl. per day on initial test but the production has declined rapidly. The other Silurian wells are 41 miles west in the Shipley area of Ward County.

Work in proven fields included 255 new oil wells in the Slaughter pool in Cochran, Hockley and Terry counties which gained 8,000 acres to the proven reservoir. The pool is 18 miles long and 12 miles wide at its widest points and embraces approximately 78,000 acres within the proven limits. It is the largest pool in area with the exception of the East Texas field. The Wasson pool was the next most active field with 53 successful completions and 2,000 acres of reserve added. The Mascho pool in Andrews County added 5,000 acres of productive territory with 38 new oil wells. Sand Hills in Crane County, Seminole in Gaines County, Taylor-Link and Walker and Apco-Warner in Pecos County, North Cowden and Goldsmith in Ector County were among the other more active fields.

The entire district had its prospects brightened during the year with the announcement and the starting of construction on two new major pipeline outlets. One of the principal problems in the past has been the lack of sufficient pipe-line capacity but with the new markets to become accessible this summer the financial tone is considerably improved. War demand offered prospects of absorbing some of the excess productive capacity of the district.

WEST TEXAS DISTRICT

Summary of Wells Completed During 1943

Fields, county—	Comp.	Oil	Prod.	Gas	Dry
Wildcats	110	12	9,894	1	97
Abell Permian, Pecos	3	3	73	0	0
Abell, Pecos	10	8	5,443	0	2
Apco-Warner, Pecos	14	12	10,543	0	2
Barnhart, Reagan	14	13	37,567	0	1
Beddo, Runnels	1	0	0	0	1
Big Lake, Reagan	2	0	0	0	2
Byrd, Ward	4	3	443	0	1
Cedar Lake, Gaines	3	3	1,431	0	0
Church & Fields, Crane	4	4	728	0	0
Clara Couch, Crockett	3	1	150	0	2
Crockett, Crockett	1	1	19	0	0
Dean, Cochran	2	2	206	0	0
Deep Rock, Andrews	2	2	51	0	0
Dune, Crane	1	1	79	0	0
Eaves, Winkler	5	5	643	0	0
Embar Ellenburger, Andrews	17	16	11,786	0	1
Embar Permian, Andrews	9	8	1,322	0	1
Emma, Andrews	2	2	873	0	0
Emperor, Winkler	8	8	4,889	0	0
Emperor Deep, Winkler	1	1	565	0	0
Estes, Ward	5	4	744	0	1
Foster, Ector	5	5	1,075	0	0
Fuhrman, Andrews	1	1	350	0	0
Fullerton, Andrews	19	17	24,271	1	1
Funk, Tom Green	1	1	0	0	1
Goldsmith, Ector	14	14	2,400	0	0
Halley, Winkler	2	2	411	0	0
Heiner, Pecos	1	1	102	0	0
Henderson, Winkler	1	0	0	0	1
Howard-Glasscock	6	5	832	0	1
Iatan, East Howard, Howard	14	11	2,360	0	3

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Replacing Super Shrink-Grip tool joints is a simple and easy operation Just cut off the old tool joints, heat the new tool joints and screw them onto the drill pipe by hand The double seal protects the pipe threads and rethreading is not necessary.

Add these money-saving features to your 1944 expenditures and specify Reed Super Shrink-Grip Tool Joints on your next string of pipe.

When replacements are necessary...

SIMPLY CUT OFF THE OLD TOOL JOINT . . . HEAT THE NEW TOOL JOINT . . . AND SCREW IT ON BY HAND

BIT COMPANY

EXPORT OFFICE:
1836 R. C. A. BUILDING
NEW YORK 20 U. S. A.

Field—	Comp.	Oil	Prod.	Gas	Dry
Johnson, Ector	1	1	375	0	0
Keystone-Colby sand, Winkler	11	10	1,743	0	0
Keystone, Winkler	2	2	120	0	0
Lehn, Pecos	5	5	229	0	0
Masco, Andrews	39	38	5,532	0	1
Magnolia Sealy, Ward	1	0	0	0	1
McCamey, Upton	20	20	2,715	0	0
McKee, Crane	2	1	357	0	1
Means, Andrews	3	3	541	0	0
Monahans, Ward	1	0	0	0	1
Munger & Nix, Andrews	1	1	120	0	0
Noelke, Crockett	9	5	7,107	2	2
North Cowden, Ector	28	27	9,461	0	1
Olson, Crockett	4	2	243	1	1
O'Neal, Pecos	1	1	61	0	0
Ownby, Yoakum	1	1	175	0	0
Pecos Valley high gravity, Pecos	1	1	96	0	0
Penwell, Ector	2	1	[illegible]	0	1
Pyote, Ward	1	0	0	0	1
Russell, Gaines	1	1	146	0	0
Sand Hills, Crane	14	14	10,836	0	0
Seminole, Gaines	11	11	4,851	0	0
Sharon Ridge, Scurry	10	9	1,381	0	1
Shipley, Ward	7	6	722	0	1
Slaughter, Cochran-Hockley-Terry	256	255	181,673	0	1
Snyder, Howard	1	1	100	0	0
South Cowden, Ector	6	6	1,271	0	0
South Sealy, Ward	1	1	327	0	0
South Shipley, Ward	1	1	67	0	0
South Ward, Ward	1	0	0	0	1
Stinnett, Lubbock	2	0	0	0	2
Spencer, Ward	4	2	198	0	2
Taylor-Link, Pecos	19	14	2,434	0	5
Tobarg, Pecos	7	7	285	0	0
Vincent, Howard	2	0	0	0	2
Walker, Pecos	16	14	808	0	2
Waples-Platter, Yoakum	3	3	509	0	0
Wasson, Yoakum and Gaines	61	53	23,488	0	8
Weiner, Winkler	15	13	2,555	0	2
West Andrews, Andrews	2	0	0	0	2
Westbrook, Mitchell	10	10	690	0	0
Whiteface, Cochran	2	2	613	0	0
White & Baker, Pecos	10	10	619	0	0
Winters, Runnels	2	1	17	0	1
World, Crockett	7	7	788	0	0
Yates, Pecos	2	1	22	0	1
Total 1943	891	717	34,601	6	168

WEST TEXAS
Completions by Months

Month—	Comp.	Oil	Gas	Dry	Footage
January	64	52	1	11	293,683
February	64	53	1	10	302,627
March	66	52	1	13	324,288
April	64	55	0	9	298,144
May	65	50	0	15	317,384
June	60	40	1	19	292,706
July	75	64	0	11	340,867
August	66	53	0	13	333,603
September	79	65	2	12	368,467
October	96	84	0	12	441,594
November	111	92	0	19	511,917
December	81	57	0	24	369,707
Total	891	717	6	168	4,194,99-

TEXAS PANHANDLE
Summary of Wells Completed During 1943

County—	Comp.	Oil	Prod.	Gas	Dry
Wildcats	2	0	0	0	2
Carson	22	13	4,920	8	1
Gray	63	47	6,396	7	9
Hutchinson	97	86	11,289	3	8
Moore	9	2	82	7	0
Potter	3	0	0	3	0
Wheeler	4	0	0	2	2
Total	200	148	22,667	30	22

TEXAS PANHANDLE
Completions by Months

Month—	Comp.	Oil	Gas	Dry	Footage
January	19	9	7	3	50,807
February	18	9	9	0	37,012
March	16	13	0	3	37,012
April	17	11	4	2	40,512
May	18	13	2	3	53,322
June	12	10	1	1	37,670
July	13	11	1	1	38,995
August	19	14	1	4	64,326
September	14	12	1	1	42,421
October	17	16	1	0	57,507
November	20	14	3	3	71,366
December	17	16	0	1	51,997
Total	200	148	30	22	545,935

SOUTHEAST NEW MEXICO

Maljamar Extension and Discovery In Lea Result of More Wildcatting

MIDLAND, Tex. — Both wildcatting and field development increased slightly in the southeastern New Mexico district during the second half of the year, which was characterized by only moderate results with the exception of the extension of the Maljamar pool in Lea County and one discovery in Lea which reflected major possibilities.

The Maljamar pool was extended in three directions by as many outpost wells. The first was a 2½-mile northeast outpost which pumped 96 bbl. from Grayburg lime. The second was a 4-mile-south extension which pumped 75 bbl. daily, and the third was 1 mile east with the well making 612 bbl. There were 35 wells drilled in the field which, coupled with the extensions, brought 1,200 additional acres into production.

Principal discovery in the district was Skelly Oil Co. 1-U State, NE NE 5-22s-45e, Lea County, 5 miles southeast of the West Eunice pool and the same distance west of the South Eunice pool. The field was named San Simon. The discovery well pumped 105 bbl. from the San Andres lime at 4,025 to 4,126 ft. One well is drilling 1½ mile southwest of the discovery. There were three other discoveries, one of which, the Fenton pool in Eddy County, was from the Delaware sand for a 20-bbl. comple-

PRODUCTION AND RESERVES—NEW MEXICO

(In thousands of barrels)

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Artesia-Red Lake	257	5,670	2,730	208
Artesia	183	4,989	2,011	169
Red Lake	74	681	719	39
Cooper-Lynn	1,776	26,927	30,523	187
Cooper	776	14,653	8,348	84
Eaves	343	2,178	4,322	25
Jal	152	7,488	1,762	16
Lynn	323	1,908	3,593	36
Rhodes	182	701	2,498	22
Eunice-Monument	16,324	136,395	234,605	1,179
Arrowhead	1,703	5,917	19,083	113
Eunice	6,498	65,314	94,686	485
Monument	7,190	58,730	106,270	497
South Eunice	933	6,434	14,566	84
Getty-Barber	260	1,327	1,373	25
Grayburg-Loco Hills	3,572	23,160	53,380	480
Grayburg-Jackson	1,914	13,514	36,486	238
Leonard-Anderson	362	1,815	6,685	60
Loco Hills	1,296	7,831	10,100	192
Halfway	80	331	869	6
Hobbs	3,780	104,161	85,839	251
Hospah	293	975	3,025	27
Langlie-Mattix	1,662	16,392	14,808	279
Langlie	913	8,623	8,177	121
Mattix	749	7,769	6,631	158
Lynch and North	135	6,309	2,291	11
Lusk, East and West	110	148	1,852	9
Maljamar and East and South	1,853	7,491	27,509	195
Penrose-Hardy	1,375	16,784	13,416	396
Hardy-Skaggs	438	5,043	4,157	124
Penrose	612	8,349	6,151	190
Skelly	325	3,392	3,108	84
Salt Lake	79	148	1,052	8
Shugart-Leo	197	937	3,063	35
South Lovington	588	2,221	6,779	43
Square Lake	1,051	1,407	18,593	128
Vacuum	4,953	21,529	113,471	345
West Eunice	314	789	4,011	19
Misc. S.E. New Mexico	123	690	1,210	38
Misc. N.W. New Mexico	132	7,550	1,750	69
Total	38,924	381,791	582,049	3,940

tion. The Benson pool in Eddy County was discovered by a shallow well at 1,836 ft. which made 120 bbl. of oil and 432 bbl. of water on the pump. The Turkey Track pool discovery obtained 20 bbl. per day production from lime pay at 2,575 to 2,815 ft.

Outside the Maljamar area, the principal concentration of work was in the Grayburg-Jackson and the Square Lake areas of northeastern Eddy County. Out of the 47 completions in Grayburg-Jackson, 43 were oil wells with a daily initial of 8,211 bbl. Only 1,280 productive acres added to the producing limits as much of the work was on inside locations. In Square Lake, there were 31 oil wells out of 33 completions and the productive area was expanded by 800 acres.

Two deep Ellenburger exploratory wells in the district were drilling below 8,000 ft. when the year ended. Humble Oil & Refining Co. 1 Federal-Leonard, SW SW 12-26s-37e, is one of the wells and the El Paso Natural Gas Co. 1 Ginsberg, SW NW 7-25s-38e, both in Lea County, is the other. Hopes are that the Ellenburger production in Winkler County Texas may extend into the New Mexico district.

Outstanding disappointment was failure to obtain production in the deep Lea County well drilled by Atlantic Refining Co. and Olsen on the Langlie lease. The well was carried to 9,594 ft. and extensive tests were made on several horizons in an effort to find a productive zone. The test was not yet abandoned at the year's end, but had been dropped from the active list.

SOUTHEAST NEW MEXICO
Completions by Months

Month—	Comp.	Oil	Gas	Dry	Footage
January	17	13	0	4	54,081
February	13	11	0	2	32,040
March	25	14	0	11	75,980
April	11	7	1	3	34,270
May	19	15	1	4	55,232
June	13	12	0	1	37,670
July	18	15	0	3	61,913
August	22	13	0	9	85,129
September	19	16	0	2	59,597
October	25	22	0	2	67,801
November	22	14	0	6	69,204
December	35	26	0	10	109,214
Total	239	180	2	57	742,131

SOUTHEAST NEW MEXICO
Summary of Wells Completed During 1943

Field, County—	Comp.	Oil	Prod.	Gas	Dry
Wildcats	34	6	392	0	28
Arrowhead, Lea	1	1	526	0	0
Artesia, Eddy	5	4	200	0	1
Barber, Eddy	1	1	50	0	0
East Lusk, Lea	4	0	0	0	4
Eunice, Lea	1	0	0	0	1
Fenton, Eddy	1	0	0	0	1
Getty, Eddy	4	3	156	0	1
Hobbs, Lea	1	0	0	0	1
Jackson-Grayburg, Eddy	47	43	8,211	0	4
Langlie, Lea	3	1	124	1	1
Leonard, Eddy	2	2	690	0	0
Loco Hills, Eddy	13	11	2,389	0	2
Lynn, Lea	8	8	3,245	0	0
Mattix, Lea	1	1	141	0	0
Maljamar, Lea and Eddy	37	35	8,309	0	2
McMillan, Eddy	4	1	75	1	2
Monument, Lea	1	1	35	0	0
Penrose, Lea	1	1	20	0	0
Philmex, Lea	1	1	38	0	0
Red Lakes, Eddy	6	5	47	0	1
Rhodes, Lea	7	5	903	0	2
Russell, Eddy	6	4	446	0	2
Salt Lake, Eddy	1	0	0	0	1
South Eunice, Lea	8	8	1,810	0	0
South Lovington, Lea	3	3	462	0	0
Square Lake, Eddy	33	31	4,205	0	2
Vacuum, Lea	3	3	2,076	0	0
West Lusk, Eddy	1	0	0	0	1
Fenton, Eddy	1	1	91	0	0
Total	239	180	34,601	2	57

NORTHWEST NEW MEXICO
Summary of Wells Completed in 1943

Field—	Comp.	Oil	Prod.	Gas	Dry
Barker Dome	2	0	0	1	1
Bi-clah-bi-to	1	0	0	0	1
El Vado	1	0	0	0	1
Fulcher Basin	3	0	0	3	0
Hospah	2	2	108	0	0
Rattlesnake	2	0	0	0	2
Tocito	1	0	0	1	0
Total	12	2	108	5	5

Completions by Months

Month—	Comp.	Oil	Gas	Dry	Footage
March	1	0	1	0	2,136
April	2	1	1	0	3,790
May	2	1	1	0	7,905
June	1	0	1	0	1,880
July	1	0	0	1	4,840
August	1	0	0	1	.....
September	1	0	1	0	2,009
October	1	0	0	1	3,345
November	1	0	0	1	730
December	1	0	0	1	870
Total	12	2	5	5	27,523

Fig. 170
400-lb. Test

Fig. 192
1600-lb. Test

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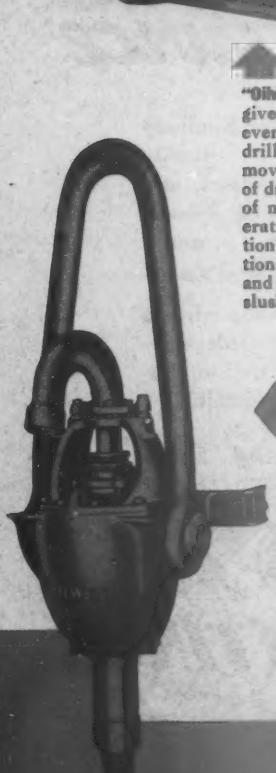
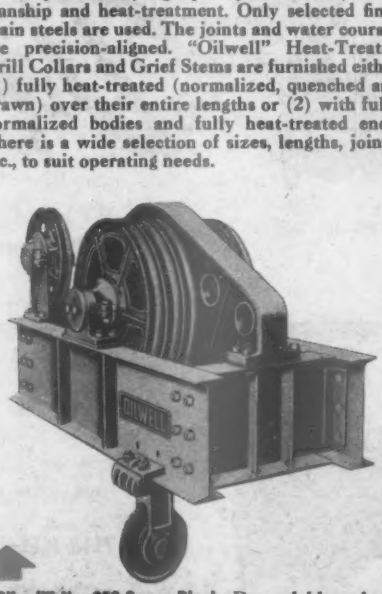
"Oilwell" No. 64-A Universal Hoisting Unit. This sturdy unit gives the dependable, trouble-free service operators everywhere demand in a power rig for medium-depth drilling. Its compactness and portability make it easy to move to remote locations. It is adaptable to a wide range of drilling conditions and can be used with prime movers of many types. An Airflex master clutch simplifies operation and helps reduce drilling time. Efficient utilization of power output under a variety of drilling conditions is made possible by convenient "Oilwell" single and dual engine drives, including power take-offs for slush pumps.

"Oilwell" Heat-Treated Drill Collars and Grief Stems. Safety, dependable service and long life are assured by uniformly high quality of material, workmanship and heat-treatment. Only selected fine-grain steels are used. The joints and water courses are precision-aligned. "Oilwell" Heat-Treated Drill Collars and Grief Stems are furnished either (1) fully heat-treated (normalized, quenched and drawn) over their entire lengths or (2) with fully normalized bodies and fully heat-treated ends. There is a wide selection of sizes, lengths, joints, etc., to suit operating needs.



"Oilwell" No. 100-C Swivel. One of a complete line of four modern streamlined swivels. There is an "Oilwell" swivel of ample capacity and economical size for every drilling requirement. Trouble-free performance and long life are assured by such field-proved features as: heavy-duty roller bearings; continuously circulating oilbath lubrication; wash pipe protected inside and out by an abrasion-resisting armor of DI-HARD; self-sealing lubricated wash-pipe packing requiring no adjustment; long-radius heat-treated gooseneck; shock-absorbing link-rest pads.



"Oilwell" No. 250 Crown Block. Dependable and economical operation is assured by wear-resisting working parts and provision for proper lubrication through conveniently located fittings. Each "Oilwell" crown block has a companion traveling block of the same rating with fully interchangeable sheaves and bearings. Ample strength for rated loads assures maximum safety, and a wide range of sizes makes it unnecessary to buy blocks larger than needed. All "Oilwell" crown blocks are designed for easy one-piece installation.

SOUTHWEST TEXAS

Numerous Extensions and Discoveries Indicate Another Active Drilling Year

by T. F. Smiley

SUBSTANTIAL additions to oil reserves were recorded in Southwest Texas during 1943, and developments in the closing weeks of the year foreshadowed further expansion. Of particular significance was activity in the lower Rio Grande Valley, in the Alta Mesa area of southwestern Brooks County, and in the region around the point where Goliad, Karnes and Bee counties meet. Hobson, Slick (Wilcox), Armstrong, Goebel, Runge, Cameron and other promising pools were opened. Notable extensions were registered to the Willamar field.

Wildcat operations in the Rio Grande Valley, presaged at midyear by lively transactions in leases, became realities in succeeding months, with the result that oil production in

PRODUCTION AND RESERVES—SOUTH AND SOUTH CENTRAL TEXAS

(In thousands of barrels)

SOUTH TEXAS

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Brooks County:				
Alta Mesa	147	1,369	2,891	32
Miscellaneous	.....	30	2,000	1
Total	147	1,399	4,891	33
Duval County:				
Benavides and East	1,191	12,372	14,628	208
Casa Blanca & W & N	314	1,005	3,595	74
Cedro Hill	228	963	3,687	77
Charamousca and South	102	864	1,336	34
Driscoll	996	5,883	11,117	79
Eagle Hill	191	1,989	2,011	50
Fitzsimmons	296	2,983	5,307	76
Government Wells	2,355	52,120	24,880	632
Hoffman	1,525	10,408	14,592	333
Loma Novia	1,607	28,253	13,747	531
Lockhart	74	74	1,326	10
Longhorn	368	2,229	4,271	42
Lundell	341	1,823	4,377	93
Piedre Lumbre	790	4,034	9,216	130
Sarnosa	117	2,777	1,223	34
Sejita	136	144	1,356	12
Seven Sisters and South	1,883	19,724	20,276	412
Tarancahuas	201	612	2,462	27
Miscellaneous	534	4,269	5,731	136
Total	13,249	152,526	145,158	2,900
Hidalgo County:				
Nichols	106	282	1,118	13
Sam Fordyce	95	8,183	917	44
Sullivan City	106	612	1,788	25
Miscellaneous	.....	176	.....	.....
Total	307	9,253	3,823	82
Jim Hogg County:				
Colorado	563	2,885	7,715	236
Kelsey	542	2,549	27,451	90
Miscellaneous	117	8,604	1,204	136
Total	1,222	14,038	36,370	462
La Salle County:				
Washburn	117	222	1,878	21
McMullen County:				
Ezzell	242	2,940	2,460	125
Jacobs	85	1,753	947	71
Miscellaneous	134	1,486	1,394	86
Total	461	6,179	4,801	282
Starr County:				
Boyle	122	295	1,605	15
Guerra	140	1,421	2,079	10
Sun and North	1,043	2,337	18,663	107
Rincon and North	2,470	6,334	27,666	186
Yturria	119	179	1,021	11
Miscellaneous	136	1,979	2,529	124
Total	4,030	12,545	53,563	423
Webb County:				
Adami	81	551	649	56
Aviator	85	6,263	727	74
Cole-Bruni-O'Hern	849	19,070	7,930	278
Glen	360	1,280	5,140	68
Killam and North	163	1,359	1,541	86
Lopez	956	12,415	9,585	306
Mirando City	96	9,417	1,083	62
Volpe	127	603	1,697	28
Miscellaneous	233	6,673	1,913	86
Total	2,950	57,611	30,365	1,044
Zapata County:				
Comitas	108	9,738	1,062	142
Escobas-Jennings	496	2,905	4,895	316
Mirando Valley	73	1,529	671	66
Miscellaneous	13	2,852	2,772	35
Total	690	17,024	9,400	559
Total South Texas	23,173	270,797	289,849	5,896

SOUTH CENTRAL TEXAS

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Bastrop County:				
Hilbig	130	1,819	2,381	12
Miscellaneous	39	1,533	378	21
Total	169	3,352	2,759	33
Bexar County:				
Somerset	87	11,638	1,322	459
Miscellaneous	72	2,146	612	381
Total	159	13,884	1,934	840
Caldwell County:				
Luling-Branyon	1,761	80,544	16,516	720
Lytton Springs	84	8,632	668	117
Salt Flat and North	826	44,598	8,502	250
Tenney Creek	90	293	1,707	907
Miscellaneous	104	3,636	1,614	106
Total	2,865	137,723	29,007	1,216
Frio County:				
Pearsall	250	1,961	4,440	37
Guadalupe County:				
Darst Creek	2,733	56,357	23,643	339
Miscellaneous	33	604	328	46
Total	2,766	56,961	23,971	385
Miscellaneous counties	196	11,906	1,318	638
Total S. C. Texas	6,407	225,677	63,436	3,149

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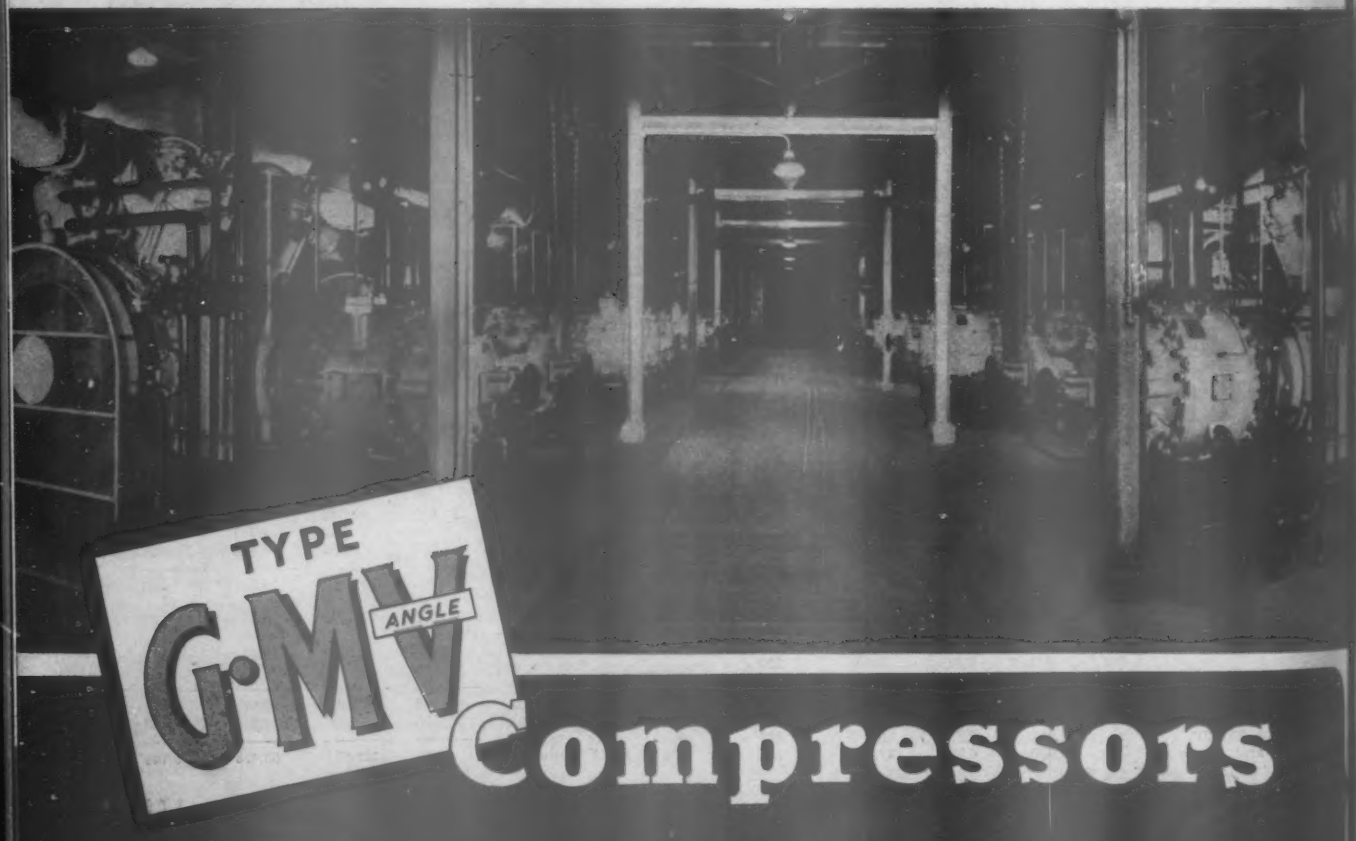
Compressors like these are at work not only in special war plants but in refineries, pumping stations, gas plants, chemical and other industrial plants in all parts of the country . . . wherever reliable, flexible, precision compressors are needed.



five counties grouped at the southern border of Texas rose from 272,000 bbl. in October 1942 to 735,620 bbl. in October 1943. Drilling plays under way at the year's end indicated that the figures would soar still higher in 1944. There were 35 fields in these five counties—Starr, Hidalgo, Willacy, Jim Hogg, and Brooks—compared with 26 in 1942.

The eventual boundaries of the big Willamar field, in Willacy County, were a subject of speculation at the year end. Two major extensions were made during 1943. In August, Baldridge & King carried production 2 miles southward by bringing in a 360-bbl. well 7 miles north of Rio Grande City. In October Pan American Producing Co. extended the known limits of the pool a mile to the north with a 243-bbl. well.

What many observers characterized as the most important deep oil strike of the year along the lower Texas border, because of the drilling campaign it heralded, was Humble Oil & Refining Co. 1 Scott & Hopper, which in December opened the pool of that name in Brooks County. The well, 4 miles northeast of the Alta Mesa pool, showed initial production of 178 bbl. daily from the Vicksburg.

Brooks County Discovery

Brooks County became the busiest wildcatting area of its size in deep South Texas. Before the new year arrived Humble had skidded rig to location for 2 Scott & Hopper and was preparing to spud in. The Texas Co. had spotted location for a test 1½ miles east of the Alta Mesa pool and south of the field opener. Sun Oil Co. had staked a location 16 miles south of Falfurrias, and Shell Oil Co., Inc., had taken steps preliminary to drilling a test 1 mile northeast of the Kelsey field. It was understood that Humble's plans comprehended the drilling of 10 wells on the Atwood ranch, in Willacy County. An oil camp had been established and a road to the acreage constructed. No announcement was made concerning the location of projected wells, but it was said they would be on the Willamar structure.

Lease and royalty prices reached high figures as a result of the heavy drilling program in the Willamar field proper. Some royalty in the pool changed hands at a $300 base.

Detailed seismograph and gravimeter work was followed in May by completion in Goliad County of what was designated as the largest Wilcox sand discovery in the Southwest Texas territory. This was Continental Oil Co. 1 Wood, which opened the Slick (Wilcox) pool. The structure from which the discovery produces is believed to be a large one, with a thick pay sand, pointing to prolonged producing life.

Initial production of the Continental well was 249 bbl. of 36-gravity oil. In the remaining months of 1943 a dozen wells had been drilled in the field, which was found to lie both in Golid and De Witt counties. All were excellent producers. Tests reported at Superior Oil Co. 1 Kerlick in the closing days of December gave assurance that this well would extend the field 1,800 ft. to the north.

Golid County contributed another impressive discovery in December, when Fred W. Shield opened the Terrell Point field with his 1 Terrell, flowing 156 bbl. daily from the Frio.

Karnes County became a center of lively operations with the opening of the Hobson field by Seaboard Oil Co. in February. A fair proportion of wells drilled later in the year were successful, producing from around the 4,000-ft. level. Added to the advantage of shallow production, with its lower drilling costs, is the fact that the oil from the Hobson field is of high octane quality. In December, Karnes contributed the Runge field, the discovery being Arkansas Fuel Oil Co. 1 Lyons, with an initial production of 137 bbl. of oil. The field, 7 miles northeast of the Hondo Creek pool, was expected to witness a brisk drilling program in 1944.

The Armstrong field, opened in October in Jim Hogg County with a 317-bbl. producer by The Texas Co., was also believed in line for active development.

In the South Central Texas district all but one of the 65 wildcats drilled were casualties, the lone exception being a 29-bbl. producer in Atascosa County.

SOUTH TEXAS
Summary of Wells Completed in 1943

Field—	Comp.	Oil	Prod.	Gas	Dry
Armstrong	5	3	532	0	2
Aviator	15	5	346	1	9
Barbacosa	2	0	0	0	2
Boyle	3	1	40	0	2
Bridwell	2	2	230	0	0
Cadena	15	9	737	1	5
Cameron	6	4	772	0	2
Casa Blanca	1	0	0	0	1
Chaparosa	1	0	0	0	1
Colorado	14	12	978	0	2
Conoco-Driscoll	15	8	1,308	1	6
Coquat	1	1	32	0	0
East	13	10	934	0	3
East Benavides	1	1	33	0	0
East Cole	1	0	0	0	1
Frost	1	1	13	0	0
Glen	3	0	0	0	3
Goebel	1	1	209	0	0
Government Wells	4	1	62	0	3
Green Branch	1	0	0	0	1
Guerra	1	1	97	9	0
Gutierrez	1	0	0	0	1
Hartman	1	0	0	1	0
Kittie	1	0	0	0	1
Kohler	1	0	0	0	1
Kreis	1	1	10	0	0
Labbe	1	0	0	1	0
Lockhart	17	10	510	4	3
Lockhart-Thomas	1	1	78	0	0
Longhorn	1	1	46	0	0
Las Animas	1	0	0	0	1
Lykes	1	0	0	0	1
McLean	2	0	0	0	2
Mirando Valley	1	0	0	0	1
Mountain View	1	0	0	0	1
Neuhaus	1	0	0	0	1
North Rincon	2	0	0	0	2
North Sun	23	20	2,339	0	3
North Sweden	1	0	0	0	1
Oakville	2	2	36	0	0
Randado	1	0	0	0	1
Rincon	17	8	1,384	2	7
Ross	7	5	238	1	1
San Ysidro	1	1	20	0	0
Scott & Hopper	1	1	178	0	0
Sejita	15	12	1,132	0	3
South Campana	4	1	55	2	1
Southeast Fitzsimmons	1	1	7	0	0
Southeast Lockhart	1	0	0	1	0
South Washburn	1	1	10	0	0
South White Creek	6	2	95	0	4
Strake	7	3	882	1	3
Sun	1	0	0	1	0
Ulrich	3	2	120	0	1
Washburn	9	6	1,934	0	3
Weil	4	3	234	0	1
Yaeger	11	4	329	0	7
Yturria	2	0	0	0	2
Wildcat failures	146	0	0	0	146
Total	404	145	15,640	17	242

SOUTH TEXAS
Completions by Months

Month—	Comp.	Oil	Gas	Dry	Footage
January	37	13	0	24	146,143
February	23	6	1	16	93,284
March	34	12	2	20	139,873
April	43	13	1	29	162,304
May	25	8	0	17	101,202
June	30	7	0	23	114,691
July	44	17	3	24	181,683
August	31	13	2	16	130,566
September	68	32	5	31	286,348
October	26	12	2	12	135,853
November	34	11	1	22	163,093
December	9	1	0	8	36,060
Total	404	145	17	242	1,681,099

SOUTH TEXAS
Summary of Wildcats Completed in 1943

County—	Comp.	Oil	Prod.	Gas	Dry
Brooks	5	1	178	0	4
Duval	38	4	219	0	34
Jim Hogg	13	3	439	0	10
La Salle	5	1	10	0	4
Live Oak	23	2	241	0	21
McMullen	16	0	0	1	15
Starr	37	6	485	1	30
Webb	17	1	45	0	16
Zapata	10	0	0	0	10
Total	164	18	1,617	2	144

SOUTH CENTRAL TEXAS
Summary of Wildcats Completed in 1943

County—	Comp.	Oil	Prod.	Gas	Dry
Atascosa	2	1	29	0	1
Bastrop	2	0	0	0	2
Bell	5	0	0	0	5
Bexar	1	0	0	0	1
Caldwell	4	0	0	0	4
Dimmit	2	0	0	0	2
Gonzales	6	0	0	0	6
Guadalupe	8	0	0	0	8
Kerr	1	0	0	0	1
Kimble	1	0	0	0	1
Lee	3	0	0	0	3
Medina	1	0	0	0	1
Menard	1	0	0	0	1
Milam	3	0	0	0	3
Travis	11	0	0	0	11
Williamson	7	0	0	0	7
Wilson	7	0	0	0	7
Total	65	1	29	0	64

SOUTH CENTRAL TEXAS
Summary of Wells Completed in 1943

Field—	Comp.	Oil	Prod.	Gas	Dry
Bateman (N. Dale)	2	2	203	0	0
Bee Creek	2	1	61	0	1
Chittim	1	0	0	0	1
Dale	3	1	35	0	2
Gas Ridge	1	0	0	0	1
Imogene	4	3	665	0	1
Pearsall	3	3	166	0	0
Von Ormy	1	0	0	1	0
Walnut Creek	1	0	0	0	1
Wildcat failures	63	0	0	0	63
Total	86	10	1,130	1	70

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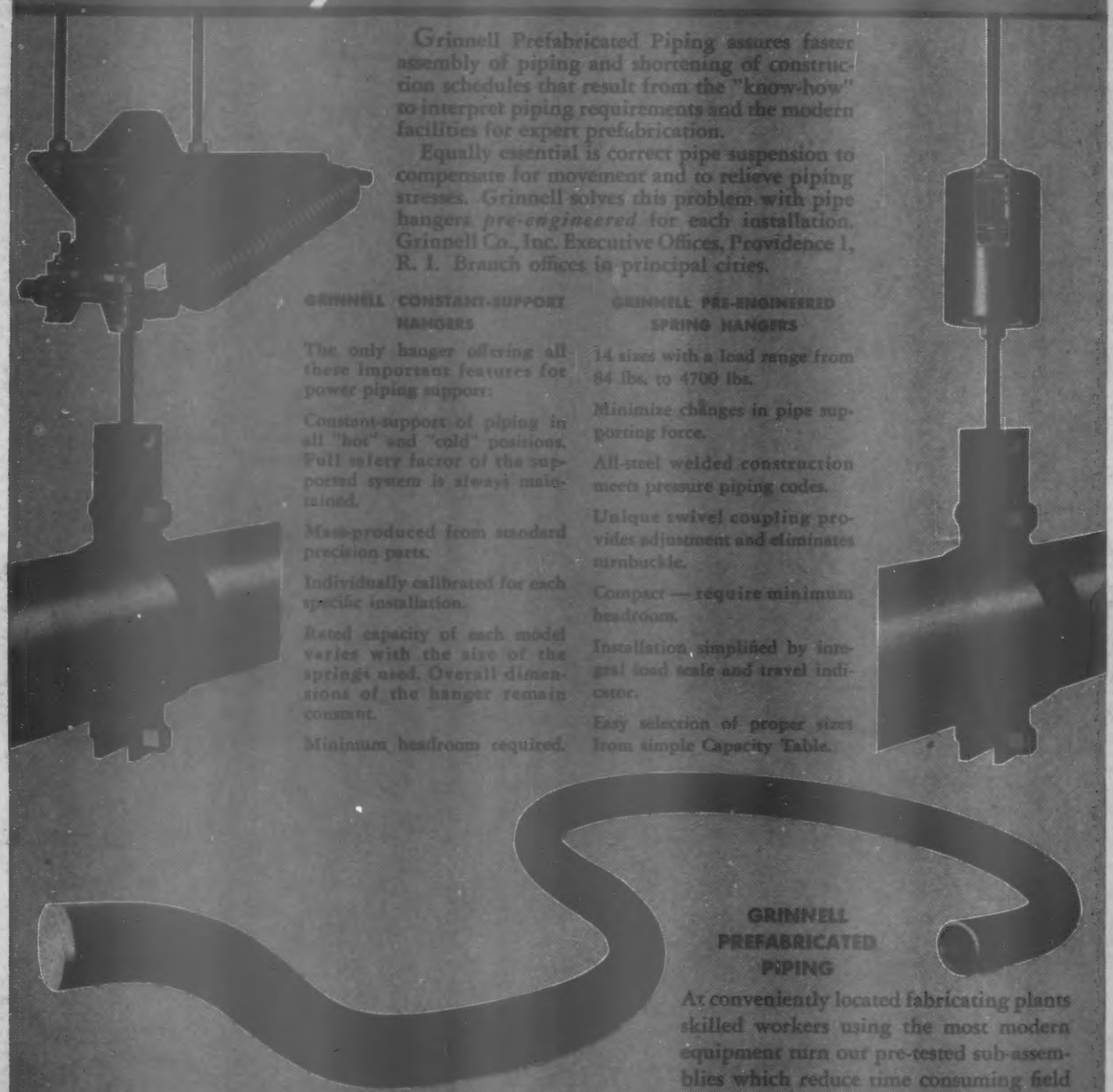

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SOUTH CENTRAL TEXAS

Completions by Months

Month—	Comp.	Oil	Gas	Dry	Footage
January	10	3	0	7	34,025
February	7	2	0	5	17,052
March	5	0	0	5	11,001
April	5	0	0	5	28,011
May	2	0	0	2	3,617
June	6	1	0	5	23,659
July	8	1	0	7	19,823
August	10	1	0	9	9,015
September	6	1	0	5	29,289
October	7	0	1	6	19,264
November	12	0	0	12	31,645
December	3	1	0	2	8,783
Total	81	10	1	70	225,182

LOWER GULF COAST

Summary of Wells Completed, 1943

Field—	Comp.	Oil	Prod.	Gas	Dry
Agua Dulsa	24	15	2,673	3	6
Alice	3	0	0	3	0
Armagosa	3	0	0	2	1
Baldwin	7	5	1,552	0	2
Ben Bolt	3	0	0	0	3
Bentonville	5	4	502	0	1
Blanconia	3	2	124	1	0
Burnell (Wilcox)	1	1	87	0	0
Cabeza Creek	1	1	14	0	0
Cosden (Wilcox)	1	1	24	0	0
Dinn	1	1	15	0	0
Duck Bay	2	1	162	0	1
East Placedo	1	1	46	0	0
East White Point	5	5	1,095	0	0
Fox	1	0	0	1	0
Gallagher	5	2	270	0	3
Greta	2	2	183	0	0
Hobson	15	10	1,610	0	5
Hondo Creek	3	1	132	0	2
Inari	1	0	0	1	0
Jay Welder	1	0	0	0	1
Keeran	1	0	0	1	0
Kingsville	1	1	99	0	0
Koopman	1	0	0	1	0
La Gloria	2	0	0	2	0
Midway	12	6	704	0	6
Mineral	2	2	174	0	0
Nordheim	3	2	111	1	0
North Magnolia City	7	5	2,017	1	1
North McFaddin	7	1	304	4	2
North Pettus (Wilcox)	3	0	0	3	0
North Porter	8	6	896	0	2
Odem	16	13	1,599	1	2
O'Neil	1	1	52	0	0
Petronilla	2	2	172	0	0
Pettus	1	1	137	0	0
Placedo	2	2	213	0	0
Plymouth	3	3	376	0	0
Porter	18	12	1,136	1	5
Powderhorn	1	0	0	0	1
Quinto Creek	2	0	0	1	1
Richard King	7	7	785	0	0
Riverside	2	0	0	1	1
Robstown	2	2	183	0	0
Rooke	2	2	216	0	0
Runge	1	1	137	0	0
St. Charles	1	1	124	0	0
Seeligson	77	76	20,296	0	1
Shield	1	1	128	0	0
Slick (Wilcox)	12	12	2,943	0	0
South Caesar	12	12	1,116	0	0
South Sinton	1	0	0	1	0
Stratton	32	27	3,846	3	2
Taft	1	1	82	0	0
Terrell Point	1	1	156	0	0
Thomaston	1	0	0	0	1
Violet	1	1	6	0	0
Weiss	1	1	91	0	0
West Alfred	1	0	0	0	1
West Tuleta (Wilcox)	1	0	0	1	0
Willamar	6	6	1,478	0	0
Wilson	1	1	150	0	0
Woodsboro	5	4	399	1	0
Yorktown	1	1	228	0	0
Wildcat failures	119	0	0	0	119
Total	471	287	48,843	35	169

LOWER GULF COAST

Summary of Wildcats Completed, 1943

County—	Comp.	Oil	Prod.	Gas	Dry
Aransas	1	0	0	0	1
Bee	29	3	203	1	25
Calhoun	2	0	0	0	2
Cameron	1	0	0	0	1
De Witt	5	0	0	0	5
Goliad	4	2	263	0	2
Hidalgo	5	0	0	0	5
Jim Wells	24	4	338	0	20
Karnes	17	6	710	0	11
Kenedy	2	0	0	0	2
Kleberg	3	0	0	0	3
Nueces	8	1	6	0	7
Refugio	5	1	91	1	3
San Patricio	12	1	52	0	11
Victoria	18	0	0	0	18
Willacy	3	0	0	0	3
Total	139	18	1,657	2	119

LOWER GULF COAST

Completions by Months

Month—	Comp.	Oil	Gas	Dry	Footage
January	23	14	2	7	139,151
February	32	14	3	15	198,466
March	23	18	1	4	145,960
April	37	28	3	6	228,469
May	35	17	3	15	222,233
June	34	19	0	15	211,791
July	46	25	3	18	277,148
August	34	30	1	13	203,932
September	63	33	6	26	389,870
October	45	24	4	17	270,558
November	32	20	1	11	200,565
December	65	35	8	22	410,297
Total	471	287	35	169	2,898,440

PRODUCTION AND RESERVES—LOWER GULF COAST

(In thousands of barrels)

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Aransas County:				
Aransas Pass	659	12,210	13,790	186
Miscellaneous	2	10	30	1
Total	661	12,220	13,820	187
Bee County:				
Caesar and South	378	1,494	8,606	37
Dirks	190	6,188	2,912	85
Pettus	211	9,778	3,322	78
Miscellaneous	96	8,103	1,460	50
Total	877	25,563	16,300	250
Calhoun County:				
Heyser	3,358	20,604	33,306	200
Jay-Welder	77	168	1,032	5
Miscellaneous	44	636	464	4
Total	3,479	21,408	34,802	209
Goliad County	78	254	5,022	11
Karnes County:				
Hobson	132	132	2,868	10
Porter	81	81	1,119	13
Miscellaneous	65	1,080	1,020	26
Total	278	1,293	5,007	49
Kleberg County	14	806	144	3
Jim Wells County:				
Alfred and West	165	435	2,065	22
Alice and East	746	5,068	11,332	67
Ben Bolt	667	2,708	8,292	66
Gandy	131	131	1,869	9
Orange Grove	521	1,632	4,668	31
Reynolds	184	1,364	2,266	23
Seeligson	1,569	2,278	47,722	169
Wade City	946	3,463	10,537	93
Miscellaneous	255	2,849	4,800	40
Total	5,184	19,928	93,551	520
Live Oak County:				
Oakville	178	1,007	2,993	30
White Creek and South	147	635	2,065	37
Miscellaneous	55	761	686	6
Total	380	2,403	5,744	73
Nueces County:				
Agua Dulce-Stratton	3,550	9,400	77,600	262
Baldwin	75	933	1,067	12
Clara Driscoll and South	996	5,567	11,653	118
Flour Bluff and East	968	8,684	17,316	104
Luby and North	1,267	8,635	17,365	148
Minnie Bock	745	2,684	7,316	64
Richard King	985	3,430	10,970	80
Saxet	2,427	44,891	29,609	300
Shield	132	365	1,635	10
Turkey Creek	469	4,690	5,310	49
Miscellaneous	248	7,371	3,050	26
Total	11,862	96,650	182,900	1,173
Refugio County:				
Greta	1,537	29,622	24,378	200
La Rosa	645	4,366	15,734	84
Mellon Creek	191	744	1,956	10
Refugio-Mission River	1,627	50,269	18,731	170
Tom O'Connor	13,027	46,723	353,277	448
Woodsboro	86	143	1,857	7
Miscellaneous	37	845	578	8
Total	17,150	132,712	416,511	927
San Patricio County:				
Midway	1,099	3,517	12,983	68
Odem	654	1,062	8,139	36
Plymouth	3,336	29,062	34,935	185
Taft	461	5,802	9,198	69
White Point and East	3,091	15,265	39,735	234
Miscellaneous	.....	112	.....	.....
Total	9,441	54,820	104,990	612
Victoria County:				
Colletto Creek	149	1,663	1,937	33
Cologne	87	200	1,000	7
Keeran	199	1,571	3,029	31
McFaddin and North	1,811	5,390	18,810	92
Placedo and East	1,732	16,102	18,998	180
Miscellaneous	61	434	781	17
Total	4,039	25,360	44,555	350
Willacy County:				
Willamar	131	294	3,776	10
Total L. Gulf Coast	53,574	393,641	927,122	4,374

EASTERN TEXAS

New Hope Field Shows Best Prospects for Development

by Harry F. Simons

TYLER, Tex.—Exploration work in East Texas which was set under way by the discoveries of more than a year ago produced only five new oil pools in the district despite the total of 115 completed wildcats. The New Hope pool in Franklin County was the discovery having the best possibilities with production from both the Rodessa and Travis Peak formations. Work in proven fields was slow, with exception of Wood County.

The discovery well at New Hope was the Tide Water Associated Oil Co. and Seaboard Oil Co. 1 A. J. Bacon in the Maxmillian Survey, 4 miles north of Scroggin, completed May 8. Rodessa pay at 7,295 to 7,305 ft. flowed initial production of 348 bbl. daily. Travis Peak pay was at 7,902 to 8,089 ft. and the well flowed 208 bbl. from that zone. Because of depths and natural drilling difficulties only two additional wells were completed during the second half of the year to give the pool 120 proven acres. The second well had Rodessa pay at 7,295 to 7,311 ft. and it made 349.44 bbl. per day. Travis Peak pay was at 7,914-80 ft. and produced 70.29 bbl. Gravity of the Rodessa oil is 42° A.P.I. and that of the Travis Peak is 47.7° A.P.I. The seismograph picture indicates a large structure. Three drilling wells are under way in the field. Two miles northwest of the discovery, a dry hole has been drilled at Humble Oil & Refining Co. 1 Solon King, William Lacy Survey, in which Travis Peak was topped at 8,068 ft. and the hole was carried to 8,243 ft. without finding production.

Only one new pool resulted from the wildcatting in Wood County which was stimulated by the discovery and development of the Quitman field. The Manziel (Cartwright) pool was discovered by Bobby Manziel 1 W. J. Bailey, Samuel Burch Survey, Wood County, 4 miles southeast of the Coke field. The well flowed 248 bbl. from Paluxy sand pay at 6,244 to 6,319 ft. Oil was 34 gravity. Seven oil wells and three dry holes have been completed since the discovery. Four tests are currently drilling, one of them to the Travis Peak which has indicated good possibilities as it recovered 180 ft. of 40-gravity oil on drill-stem test at 8,758-68 ft.

In Rusk County, the Henderson pool was discovered by the Beacon Oil & Refining Co. and American Liberty Oil Co. 1 J. H. Allen estate, Taylor Brown Survey. The well flowed 232 bbl. of 43-gravity oil on ¼-in. choke through perforations at 7,250-64 ft. opposite Pettit lime pay. The discovery was completed late in September and one well was drilling to further test the prospects at the year's end.

The only known Georgetown lime production in the East Texas district was obtained in the Hawkins field by the Humble 4-B E. M. Slaughter, Esparcia Survey, on the west side of the field. The well made 76 bbl. per day through ¼-in. choke.

There were three major extensions to the Carthage gas field in Panola County. The field is developing into one of the largest gas reserves in the state. Work in the field has increased appreciably during the past year and is continuing. Recently there have been strong indications that oil production in the vicinity is a possibility.

Biggest concentration of field work was in the Quitman pool in Wood County, which was proven to be productive in the Paluxy sand late in 1942. There were 54 oil wells added during the year with a daily potential of over 30,000 bbl. Productive scope of the field was expanded 2,000 acres. There were five dry holes and

PRODUCTION AND RESERVES—EAST TEXAS

(In thousands of barrels)

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
East Texas basin:				
Cayuga	3,383	29,195	94,805	263
Chapel Hill	681	1,344	10,256	46
Coke	469	522	4,978	29
East Texas	129,112	1,979,947	2,620,053	24,602
Hawkins	14,773	21,472	178,528	400
Kildare	544	677	3,323	29
Long Lake and East	1,515	7,638	29,862	149
Manziel	83	83	1,417	9
Navarro Crossing	86	5,945	655	21
New Hope	121	121	839	6
Pittsburg	123	265	735	6
Pleasant Grove	74	164	836	8
Quitman	606	606	11,712	39
Sulphur Bluff	1,507	10,904	16,096	73
Talco	9,155	67,399	106,601	714
Van	6,120	139,341	300,669	591
Welland	122	146	1,854	6
Miscellaneous	151	8,644	6,976	26
Total	158,624	2,274,415	3,290,195	27,017

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Mexia zone:				
Corsicana	129	16,930	1,470	588
Mexia	513	98,797	5,423	184
Powell	506	116,380	5,100	149
Worthem	132	23,961	909	39
Miscellaneous	155	14,636	1,862	30
Total	1,437	270,706	14,764	980
Sabine uplift:				
Rodessa	2,221	53,582	7,418	349
Miscellaneous	90	1,073	887	83
Total	2,320	54,655	8,305	432
Southern district:				
Trinity	151	2,048	1,452	15
Miscellaneous	10	379	81	73
Total	161	2,427	1,533	88
Total East Texas	162,542	2,602,203	3,314,797	28,526

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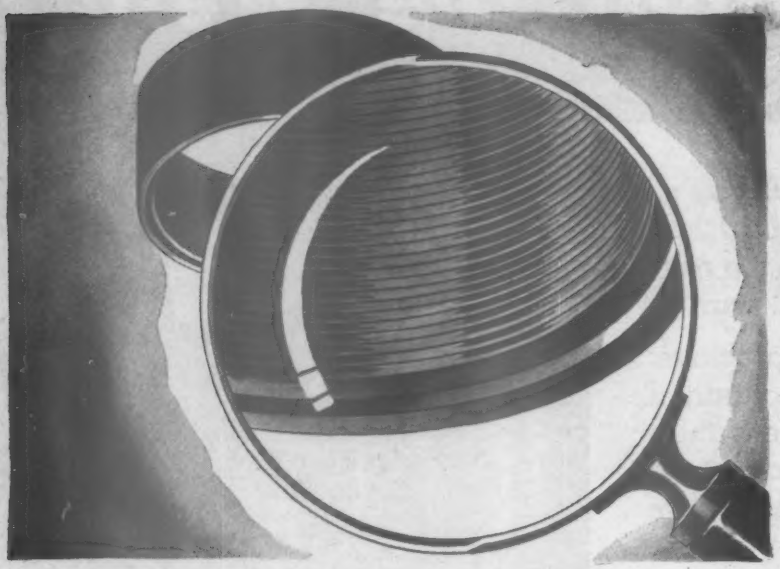

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the pool is still undefined. Five drilling operations were in progress at the start of 1944.

There were 33 new oil wells added to the Hawkins pool in Wood County out of 43 tests completed, but as most of the wells were inside locations only 500 proven acres were added. Only two tests were active at the year's end. Kildare, in Cass County, was the other center of activity with 28 oil wells and three gas wells completed out of 32 tests drilled. Proven acreage added totalled 800 acres. Two tests were active as the year came to a close.

In the Chapel Hill field, Smith County, activity was dull with the exception of the first month and the last 2 months. The flurry in November and December was a reflection of the general speedup throughout the oil country and was not caused by new developments within the field itself. There were 12 oil wells completed in the field during the year.

Deeper wildcat drilling throughout the district is in prospect for 1944 in face of the disappointment of 1943.

EASTERN TEXAS

Summary of Wells Completed During 1943

Field, County—	Comp.	Oil	Prod.	Gas	Dry
Wildcats	115	5	1,180	4	106
Campbell, Hunt	3	1	194	0	2
Carthage, Panola	2	0	0	2	0
Cayuga, Anderson	7	2	245	2	3
Chapel Hill, Smith	15	12	2,349	1	2
Coke, Wood	3	3	419	0	0
East Texas, Rusk, Gregg	1	0	0	0	1
Grapeland, Houston	3	1	90	1	1
Groesbeck, Limestone	1	1	5	0	0
Hawkins, Wood	43	33	9,162	0	10
Kerens, Navarro	1	0	0	0	1
Kildare, Cass	32	28	6,524	3	1
Lone Star, Cherokee	1	1	61	0	0
Manziel, Wood	10	7	2,451	0	3
New Hope, Franklin	2	1	419	0	1
Pittsburg, Camp.	1	1	132	0	0
Powell, Navarro	3	3	109	0	0
Quitman, Wood	57	54	30,233	0	3
Rusk, Cherokee	1	0	0	0	1
Steward's Mill, Freestone	1	0	0	0	1
Talco, Titus	1	0	0	0	1
Tehuacana, Limestone	1	0	0	0	1
Tri-Cities, Henderson	3	2	352	0	1
Van Shallow, Van Zandt	1	1	17	0	0
Weiland, Hunt	1	1	213	0	0
Willow Springs, Gregg	1	0	0	1	0
Total	310	157	54,155	14	139

EASTERN TEXAS

Completions by Months

Month—	Comp.	Oil	Gas	Dry	Footage
January	20	9	0	11	104,501
February	19	10	2	7	113,888
March	21	13	0	18	101,385
April	21	9	0	12	97,177
May	26	12	2	12	121,030
June	27	12	0	15	145,778
July	21	12	1	8	119,445
August	31	14	0	17	196,705
September	23	13	0	10	149,730
October	27	16	2	9	166,367
November	39	22	5	14	233,035
December	35	15	4	16	219,870
Total	310	157	14	139	1,768,864

CALIFORNIA

Net Reserves Decline As Production Rises Sharply

by L. P. Stockman

LOS ANGELES, Calif.—Despite increased production during 1943, second only to the crude-oil output record established in 1929, California operators were unable to balance supply and demand with the result that a substantial reduction was effected in crude and refined oil stocks.

As a consequence of large production and notwithstanding the discovery of eight new oil fields and six new gas fields, California crude-oil reserves were reduced over 220,000,000 bbl., perhaps the largest annual reduction ever suffered.

Current indications are that crude-oil production in California in 1944 will exceed that of 1943 and may surpass the 1929 record of 292,036,911 bbl. provided, of course, hostilities continue. Current production is at about the maximum rate but every indication is that the maximum efficient factor will be relaxed to some extent thus permitting the state production to rise.

The Paloma distillate field will go on sustained production for the first time with completion of its new recycling unit early this year and Pleasant Valley and other recent discoveries should show increased production. In the face of an abnormally high demand, reflecting enlarged domestic markets and greatly increased use of petroleum products by the military services, it is not likely, however, that California will be able to produce enough crude oil, distillates and natural gasoline to remove the disparity between supply and demand.

Importation of refined oil by rail from the Gulf Coast area to California will probably be increased but it is likely that the military forces will continue to take practically all of this oil. A severe contraction is in prospect for civilian consumption during the current year with the probability of a critical shortage within the next several months.

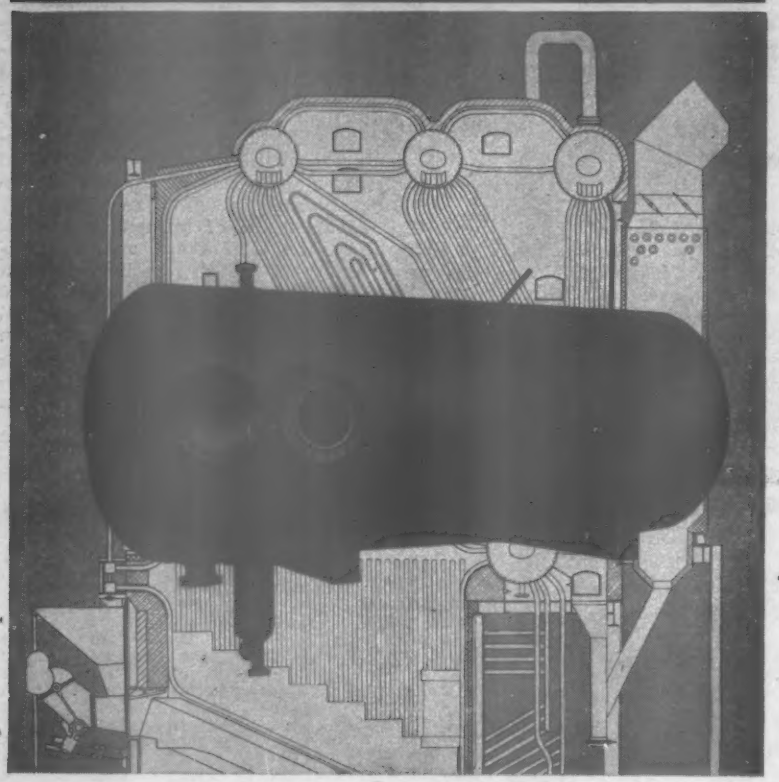
California operators completed 1,447

PRODUCTION AND RESERVES—CALIFORNIA FIELDS

(In thousands of barrels)

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
LOS ANGELES BASIN				
Brea Olinda	4,261	168,370	31,630	400
Buena Park	48	87	13	1
Coyote, East	2,076	47,682	17,318	133
Coyote, West	4,426	134,687	35,313	116
Dominguez	9,112	147,401	72,599	299
El Segundo	365	10,928	3,072	33
Huntington Beach	13,259	326,888	113,112	713
Inglewood	6,913	139,482	35,518	296
Lawndale	10	1,142	108	3
Long Beach	11,625	691,738	98,262	1,132
Los Angeles-Salt Lake	183	66,565	1,310	97
Montebello	3,961	135,345	24,655	341
Newport	3	132	47	2
Playa Del Rey	970	50,302	9,698	110
Potrero	339	4,960	2,290	25
Richfield	2,695	101,122	24,878	311
Rosecrans	2,215	53,252	15,748	186
Santa Fe Springs	7,309	489,726	60,274	557
Seal Beach	2,867	95,785	24,215	132
Torrence	2,853	110,646	24,354	639
Turnbull Canyon	120	243	507	5
Whittier	376	26,022	3,978	160
Wilmington	34,381	208,359	291,641	1,166
Yorba Linda	277	337	4,663	11
Total	110,644	3,011,201	895,203	6,868
SAN JOAQUIN VALLEY				
Antelope Hills	763	859	9,141	19
Arvin	31	1,583	917	2
Belridge, North	2,134	47,126	22,874	68
Belridge, South	2,415	26,533	22,967	495
Buena Vista Hills	5,280	292,723	57,277	822
Burrel	9	9	191	1
Canal	1,446	9,100	18,400	39
Canfield Ranch	16	117	83	1
Coalinga District	31,388	437,357	412,643	1,513
Coalinga East	*7,067*	*234,243*	*40,757*	*582*
Coalinga, Nose	*22,084*	*52,449*	*347,551*	*217*
Coalinga, West	*2,237*	*150,665*	*24,335*	*714*
Coles Levee	1,130	6,441	31,059	27
Dyer Creek	9	28	73	1
Edison	899	10,456	8,044	110
Elk Hills	5,374	167,533	217,467	232
Fruitvale	2,582	29,617	20,383	177
Greeley	4,819	13,865	51,235	84
Helm	164	247	5,253	7
Jacalitos	117	177	673	7
Kern Front	4,166	54,874	37,626	623
Kern River	3,109	287,226	22,774	1,967
Kettleman Middle Dome	....	544	.....	.....
Kettleman North Dome	15,299	280,568	149,932	266
Lanare	15	15	60	1
Lost Hills	1,329	55,270	9,730	382
McClung	19	19	181	1
McKittrick	1,721	96,129	18,871	292
Midway-Sunset	14,954	660,798	140,002	2,541
Mountain View	1,395	42,965	10,035	167
Mount Poso	8,451	71,377	53,623	456
Paloma	298	780	15,720	4
Pleasant Valley	228	228	9,772	6
Raisin City, East	295	663	4,337	9
Raisin City, West	88	88	1,437	5
Rio Bravo	5,445	21,809	78,191	100
Riverdale	604	699	3,301	25
Round Mountain	4,152	39,267	30,983	282
Shafter	14	47	53	.....
Strand, East	95	103	2,397	3
Strand, West	595	2,225	5,275	14
Tejon	7	7	243	2
Ten Section	6,558	26,953	63,047	117
Tupman	4,772	13,742	86,258	71
Union Avenue	42	157	1,093	3
Wasco	782	2,968	7,032	13
Wheeler Ridge	94	4,114	886	34
Total	133,103	2,707,406	1,631,539	10,989
COASTAL DISTRICT				
Aliso Canyon	756	3,180	21,820	18
Capitan	1,181	7,072	8,328	53
Del Valle	449	1,360	8,640	13
Elwood	1,670	70,962	9,138	52
Gato Ridge	1,301	8,023	11,327	25
Goleta	....	136	.....	.....
Newhall Potrero	1,944	5,535	23,215	42
Oak Canyon	285	487	4,513	8
Padre Canyon	345	2,222	2,778	18
Rincon	1,222	16,341	11,409	73
San Martinez	470	796	4,204	16
San Miguelito	1,612	8,870	14,630	27
Santa Barbara	43	3,567	433	16
Santa Maria	3,787	148,057	73,943	291
Santa Maria Valley	8,305	38,140	77,360	253
Summerland	4	3,176	24	5
Ventura Avenue	15,470	267,954	167,046	437
Ventura-Newhall	1,686	67,517	14,483	513
Watsonville	9	1,501	49	7
Total	40,539	655,396	453,340	1,867
Total California	284,286	6,374,003	2,980,082	19,724

UNION



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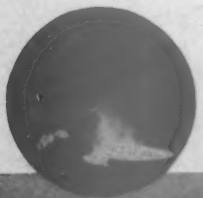

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new wells during 1943 and indications are that 1,750 new wells will be completed this year. This indicated increase in wells to be drilled can be attributed to a recent announcement that larger amounts of steel and other critical metals will be released for civilian consumption during 1944. Of the 1,447 new wells completed during

CALIFORNIA

Summary of Wells Completed, 1943

Field—	Comp.	Oil	Prod.	Gas	Dry
Aliso Canyon	3	3	2,703	0	0
Antelope Hills	11	9	2,176	0	2
Belridge, North	2	2	355	0	0
Belridge, South	179	175	8,307	0	4
Bowerbank	2	0	0	0	2
Brea Olinda	6	6	1,409	0	0
Buena Park	1	0	0	0	1
Buena Vista Hills	45	43	2,277	1	1
Burrel	1	1	342	0	0
Coalinga, East	89	85	8,384	0	4
Coalinga, Nose	1	1	591	0	0
Coalinga, West	46	44	1,872	0	2
Colusa	1	0	0	1	0
Coyote, East	8	8	642	0	0
Coyote, West	6	6	2,775	0	0
Del Valle	2	2	1,668	0	0
Dominguez	5	3	142	0	2
Edison	10	7	522	0	3
Elk Hills	20	20	5,113	0	0
El Segundo	3	0	0	3	0
Firebaugh	1	0	0	1	0
Fruitvale	7	7	627	0	0
Gato Ridge	7	6	1,439	0	1
Greeley	6	6	4,459	0	0
Helm	7	3	636	0	4
Huntington Beach	68	66	11,903	0	2
Inglewood	4	4	2,024	0	0
Jacalitos	1	1	21	0	0
Kern Front	128	126	9,257	0	2
Kern River	2	2	12	0	0
Kettleman Middle Dome	1	0	0	0	1
Kettleman North Dome	8	7	1,945	0	1
Lanare	2	1	130	0	1
Lodi	5	0	0	5	0
Los Angeles- Salt Lake	1	0	0	0	1
Lost Hills	11	11	341	0	0
Marysville Buttes	5	0	0	1	4
McClung	1	1	265	0	0
McKittrick	28	23	985	0	5
Mendota	4	0	0	4	0
Midway-Sunset	140	114	7,641	0	26
Montebello	19	18	1,539	0	1
Mount Poso	51	44	3,197	1	6
Newhall Potrero	9	9	1,993	0	0
Newport	3	2	37	0	1
Oak Canyon	5	2	317	0	3
Paloma	1	1	169	0	0
Playa Del Rey	1	1	37	0	0
Pleasant Valley	7	6	5,288	0	1
Raisin City, West	5	5	1,668	0	0
Richfield	4	4	227	0	0
Rincon	4	3	183	0	1
Rio Bravo	1	1	1,000	0	0
Rio Vista	10	0	0	10	0
Riverdale	23	21	4,785	0	2
Roberts Island	1	0	0	0	1
Rosecrans	3	2	574	0	1
Round Mountain	42	33	2,766	0	9
San Martinez	7	6	1,953	0	1
San Miguelito	2	2	600	0	0
Santa Maria	20	15	9,537	0	5
Santa Maria Valley	24	22	7,109	0	2
Seal Beach	1	1	850	0	0
Strand, East	4	2	1,225	0	2
Strand, West	1	1	1,145	0	0
Tejon	2	2	173	0	0
Thornton	5	0	0	3	2
Torrance	34	34	2,075	0	0
Turnbull Canyon	1	1	76	0	0
Tupman	4	4	1,609	0	0
Ventura Avenue	24	24	23,733	0	0
Ventura-Newhall	16	12	950	0	4
Vernalis	1	0	0	0	1
Wilmington	71	71	13,606	0	0
Yorba Linda	10	8	1,319	0	2
Wildcats	153	0	0	0	153
Total	1,447	1,150	170,302	30	267

1943, 1,150 produced oil, 30 found natural gas and 267 proved unproductive. Total footage drilled during 1943 was 4,793,042 ft. as compared with 3,358,705 ft. during 1942. Even though a substantial part of anticipated drilling during 1944 will be centered in shallow fields and especially those producing a heavy oil it is believed that the total footage in 1944 will exceed 5,000,000 ft. Any estimate of future drilling operations must be predicted on the assumption there will be ample equipment provided both for drilling and production. It has been found, however, that there is not now, nor has there been, ample drilling and production equipment available in California.

Stocks at Critical Level

A reviey of the amount of crude and refined oil in storage at Pacific Coast points should remove any doubt about the seriousness of the situation in the West and the urgent need of substantially increasing crude-oil reserves if at all possible. In the last 5 years, fuel-oil stocks have been reduced over 40,000,000 bbl. and now stand at approximately 30,000,000 bbl. A large part of present stocks are earmarked for military use so that the amount available for civilian or domestic use is relatively small. Heavy crude-oil stocks have been cut about 7,000,000 bbl. during the same period and currently total slightly over 8,000,000 bbl. Since the war, fuel-oil stocks have been severely reduced despite the large increase in production of heavy grades of crude notably at Wilmington, South Belridge, Coalinga, Midway-Sunset, McKittrick and other similar fields. Most of this heavy crude oil goes into fuel oil stocks.

Current fuel-oil demand is the highest ever recorded and a further consistent increase can be anticipated in 1944 as operations are stepped up in the South Pacific. There will probably not be any general let down in the over-all demand for California petroleum after the war because of the various kinds of new products that are being produced in larger quantities. New types of fuel and a larger demand for plastics, aviation gasoline and synthetic rubber will require the maintenance of a high rate of production in California.

CALIFORNIA

Month—	Completions by Months Comp.	Oil	Gas	Dry	Footage
January	91	73	1	17	300,116
February	79	63	0	16	256,483
March	118	94	2	22	374,032
April	111	84	6	21	376,759
May	119	93	3	23	398,668
June	140	118	2	20	436,149
July	115	97	2	16	356,968
August	136	98	3	35	461,384
September	127	89	3	35	435,980
October	126	106	3	17	421,753
November	157	131	1	25	540,919
December	128	104	4	20	433,831
Total year	1,447	1,150	30	267	4,793,042

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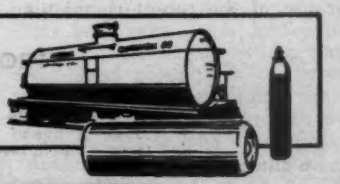

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MICHIGAN

Ratio of Producers Rises As Exploration Increases

MOUNT PLEASANT, Mich. — Despite an increase of more than 23 per cent in exploratory drilling operations in Michigan last year, the ratio of producers to failures improved only minutely and the general caliber of discoveries continued disappointing.

The Goodwell field, Newago County, west central part of the state, appears to be the best of the 1943 discoveries although production has been skidding downward since the peak of 2,000 bbl. daily was reached in September. Also, substantial volumes of water have been registered in recent extension wells north and northwest of the field, indicating that the limits of prolific production have been reached in that direction. The field produces from the Traverse, which does not measure up to Dundee in sustained productivity or ultimate recovery. Nevertheless, the Goodwell field, discovered last midyear, closed 1943 with 10 producing wells, a 6-month recovery of 249,000 bbl. and estimated reserves of 2,151,000 bbl.

Osceola County, with two new fields, Cedar and Rose Lake, in addition to Evart, which was mostly developed in 1943, continued to lead all Michigan areas in total completions. Seventy-two wells were completed in the county, and although the area headed the activity list the comparison is unfavorable with 1942 when 114 completions were registered. Rose Lake is certain to receive further development west and southwest of the currently productive area partly because of the recent completion of a 200-bbl. well in the Dundee on the southwest edge of the previously proven acreage. A failure near the end of the year, however, all but killed the possibility that the Cedar and Rose Lake fields would be joined and developed into a common reservoir.

Prosper, in Missaukee County, ranked third in the 1943 discoveries, closing the year with 11 wells and 278,000 bbl. of production. The field was discovered in April and started off with substantial flush production, totaling 121,500 bbl. to July 1. Output of 33,500 bbl. in July declined to a monthly rate of 23,300 bbl. at year's end, and appeared to be holding at that level. Further declines, however, are in prospect because there were no producers added in the field during the final quarter of the year.

A fourth new field, Woodville, is small and relatively unimportant at the current stage of development.

Much of the drilling activity in 1943 accrued to fields discovered in the latter part of 1942 and two of them, Evart in Osceola County, and Fork in Mecosta County, currently rank well forward in the list of Michigan reserves. Evart and Fork are of virtually equal rank on the basis of 1943 appraisals. Evart has a slightly more impressive production record with 1943 recovery of 1,005,000 bbl. and reserves estimated at 5,597,000 bbl. The field contained 28 producing wells at the start of this year. Drilling activity in Evart had dwindled by the end of the year, however, while exploitation limits had not yet been determined at Fork, indicating that the latter field may still prove of greater importance. Twenty-nine producing wells were in operation in the Fork field and reserves were calculated at 5,581,000 bbl.

Fourteen producers were added during the year in the Reed City field which continues as the outstanding reservoir in Michigan. A reduction of 25 bbl. daily in the per-well allowable to a flat 100 bbl. per day was ordered in December to stabilize pressure. Consequently, unless additional extensions are developed or a lower pay zone discovered, indications are that Reed City will con-

(Continued on page 220)

MICHIGAN

Completions by Months

Month—	Comp.	Oil	Gas	Dry	Footage
January	34	10	1	14	92,414
February	29	12	0	17	83,178
March	46	19	0	27	116,606
April	34	11	1	22	97,978
May	33	13	1	19	96,155
June	73	23	10	40	166,428
July	55	23	6	26	141,386
August	82	27	14	41	119,097
September	67	20	7	40	203,446
October	55	19	1	35	142,852
November	67	23	4	40	139,458
December	53	28	2	25	148,642
Total	628	235	47	346	1,547,640

MICHIGAN

Summary of Wells Completed in 1943

	Comp.	Oil	Prod.	Gas	Dry
Allegan	50	11	340	0	39
Arenac	21	6	306	1	14
Bay	33	30	2,089	0	3
Calhoun	2	0	0	0	2
Clare	49	6	1,083	20	23
Clinton	2	1	50	0	1
Gladwin	16	9	349	0	7
Gratiot	7	1	32	1	5
Isabella	7	1	20	3	3
Kent	8	0	0	0	8
Jackson	4	0	0	0	4
Lake	10	0	0	0	10
Mecosta	43	26	7,682	3	14
Missaukee	35	16	4,356	5	14
Montcalm	9	0	0	2	7
Newaygo	35	22	6,830	7	6
Ogemaw	3	2	115	0	1
Osceola	72	33	13,909	4	35
Ottawa	32	10	1,048	0	22
Roscommon	12	2	2,025	0	10
Saginaw	4	1	5	0	3
Van Buren	83	35	2,362	0	48
Wayne	4	3	29	0	1
Miscellaneous	89	20	495	5	64
Total	628	235	43,208	47	346

PRODUCTION AND RESERVES—MICHIGAN

(In thousands of barrels)

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Northern district:				
Adams	935	3,570	8,430	55
Beaverton	129	1,133	767	37
Bentley	94	818	482	43
Buckeye	427	18,919	3,481	244
Cedar	140	140	1,360	8
Clayton	181	3,835	1,465	43
Evart	1,005	1,203	5,597	28
Fork-Mecosta	706	819	5,581	29
Freeman-Redding	515	13,542	958	109
Headquarters	2,063	4,698	7,502	42
Prosper	278	278	922	11
Reed City	7,950	19,808	26,192	185
Richfield	81	153	447	12
West Branch	298	5,188	1,412	224
Winterfield	695	3,064	2,336	41
Miscellaneous	183	1,672	1,128	103
Subtotal	15,780	78,840	68,060	1,214
Central and South:				
Allegan County	587	10,816	2,184	453
Goodwell	249	249	2,151	10
Greendale	321	22,210	2,390	172
Kawkawlin	695	1,415	4,585	101
Porter-Yost	1,010	40,426	5,574	335
Sherman	117	4,186	314	55
Van Buren County	655	10,044	5,156	234
Vernon-Leaton	163	7,550	550	71
Walker	502	9,512	1,288	492
Wise	177	1,906	694	60
Woodville	58	58	342	6
Miscellaneous	221	16,690	1,510	185
Subtotal	4,755	125,062	26,736	2,133
State total	20,535	203,902	94,796	3,347

CANADIAN FIELDS

Drilling Activity Shifts to Outlying Areas

by Victor Lauriston

CHATHAM, Ont.—Crude-petroleum production (including natural gasoline) for the Canadian fields in 1943 showed, on the basis of available figures, a decline of approximately 350,000 bbl. from the 1942 totals. The 1943 output of 10,048,199 bbl. compares with 10,401,166 bbl. for 1942.

As in previous years, Alberta accounted for approximately 99 per cent of the Canadian production. Most of the Alberta production came from Turner Valley. The declining output of the latter field, where new completions were not sufficient to offset declining production of older wells, was largely responsible for the net drop in Canadian output.

Emphasis in Turner Valley development seems to have shifted from systematic drilling of proven locations. Many tests now in progress are in the marginal sections of the West Central area, where drilling is being supported by the federal government.

Nevertheless, the possibilities of extending the field do not seem entirely exhausted. Several outpost wells in the North Extension (Township 21) finished as encouragingly large producers, indicating still further possibilities in that direction. Completion of two wells in 8-18-2w5, in the south end of the field, as large producers will be followed by additional drilling in that direction.

Devonian Production Sought

A noteworthy feature of the year was the drilling of Devonian Test 1, a joint effort by a group of Turner Valley companies to test the Devonian limestone, underlying the Madison. Owing to faulting, the well, located in the West Central area, did not reach the Devonian, but was completed as a fair producer from the Madison.

The year was marked by a shift of drilling activity from Turner Valley to outlying areas. A feature was the development of the Vermilion field in eastern Alberta into the second largest producing area in the province. In this field a low-grade crude, encountered around 1,825 ft., has been found suitable for use as railroad fuel. At the end of 1942 the processing plant was shut down. Higher prices and improved processing methods appear to have put the production on an economic basis. Cannar Oils, a subsidiary of the Canadian National Railways, during 1943 drilled 27 of a projected 50-well program, most of which have been put in production. Independent operators have also carried on some development. Individual wells have a flush production up to 75 bbl. daily. Most of the drilling is on proven acreage, but some extension of the original field is indicated.

Good results were also secured in the Taber field in southern Alberta. Here Dominion Oils, a subsidiary of Standard Oil Co. of British Columbia, has continued development, drilling three producers close to the discovery well. Of these the most recent reported a flush of about 500 bbl. The producers are closely located, and efforts to develop production at remote locations so far have been unsuccessful.

Another promising border area is Del Bonita, where Pacific Oil & Refining Co. 1, LSD 12, 18-1-21w4, drilled into the Madison limestone around 5,080 ft., and indicates a fair producer.

Drilling operations in the foothills have not been as active as previously. Of five tests completed during the year two produced. In the Ram River-Clearwater area, west of Rocky Mountain House, Ram River Oils 2, LSD 8, 1-37-11w5, finished in the Devonian limestone at 4,340 ft., after prolonged testing has a potential of 133 bbl. of high-gravity crude oil, though it has not been put on steady production. Ram River Oils is undertaking additional development.

PETROLEUM PRODUCTION, 1942-1943

Field—	Production		Producing wells Jan. 1943	Producing wells Dec. 1943
Turner Valley—	1942	1943		
Shallow crude	5,806	4,842	3	3
Limestone oil wells	9,668,283	9,037,134	191	217
Limestone gas wells	27,650	47,029	37	30
Natural gasoline	302,216	464,142	4 plants	
Red Coulee	10,107	9,093	7	7
Wainwright	14,510	19,885	6	7
Vermilion	63,793	105,906	8	33
Taber	29,819	96,555	2	5
Tilley	5,718	7,565	0	1
Del Bonita	1,653	2,351	1	2
Lloydminster	477	2,672	1	2
Steveville	10,610	340	1	1
Dina-Ribstone	2,780	200	2	2
Moose dome	0	2,562	0	1
Tar Sands	10,041	0	0	0
Total	10,153,443	9,800,270	263	311
New Brunswick	28,089	25,000	0	0
Ontario	143,845	133,000	0	0
Northwest Territories	75,789	*89,929	0	0
Total	10,401,166	10,048,199	263	311

*Production figures for the Northwest Territories (Fort Norman) cover only the first 6 months; data have been suppressed since midyear.

Pouce Coupe Exploration

In the Pouce Coupe area, west of Peace River and close to the Alaska Highway, Alaska Highway Oil & Gas Co. finished a 5,000,000-cu. ft. gasser, and further drilling is being undertaken.

Another noteworthy test was Shell Exploration-Norman 1, LSD 5, 22-24-5w5, which, after establishing a new depth record for Canada of 12,056 ft., penetrating a normal Madison limestone sequence, failed to get production in two lower horizons of the lime. Tests of the upper lime and the Blairmore are pending.

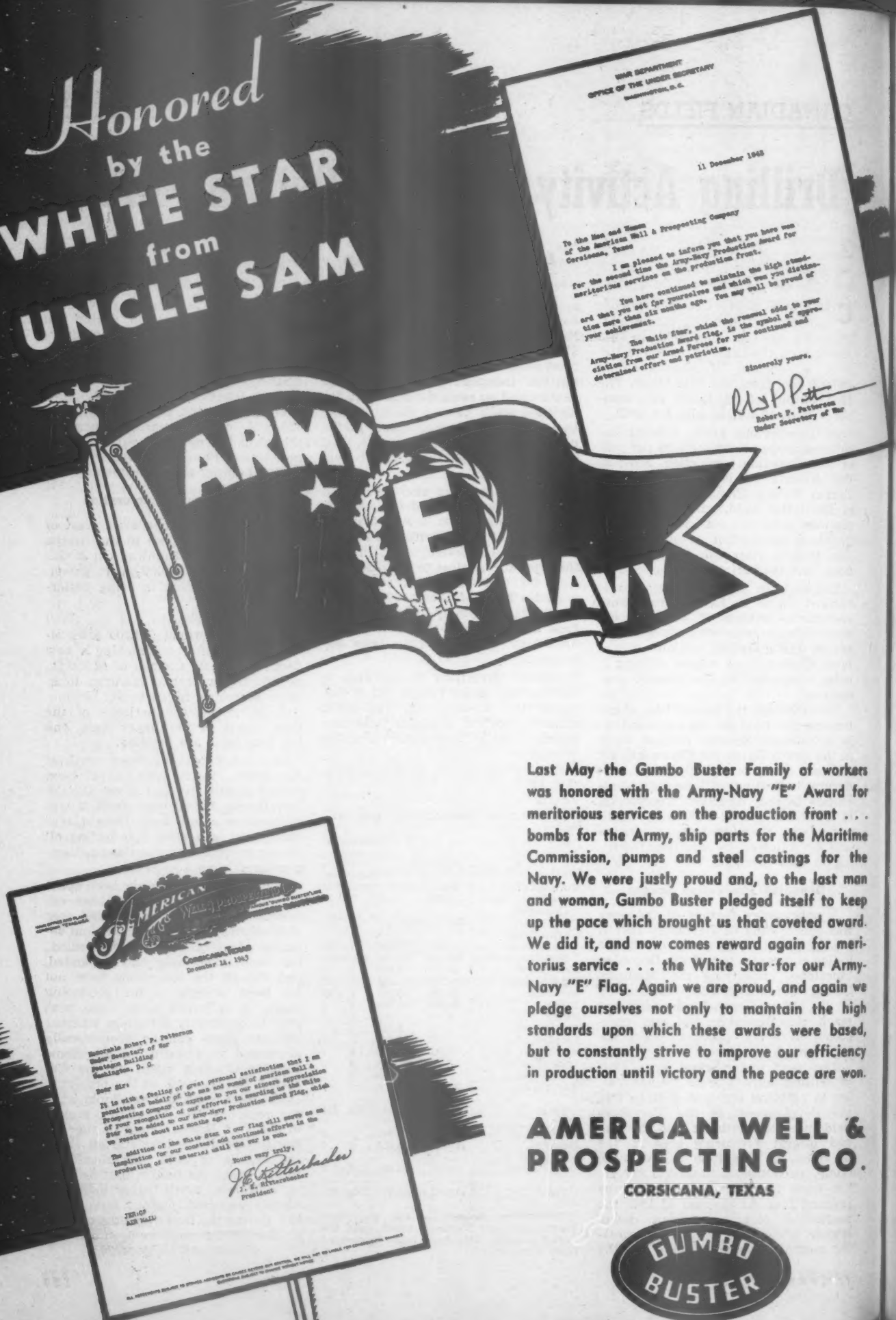
In the Athabaska district, north of Edmonton, three tests have been drilled jointly by East Crest Oil Co. and Davies Petroleums. Deca 2 was finished as a gas well, Deca 1 was abandoned, and Deca 3 is testing oil showings, apparently commercial, encountered around 1,640 ft.

Considerable money has been spent by the federal government on experimental work in the tar-sand area at McMurray. The separation and refining plant of Abasand Oils, Ltd., has been taken over and expanded, and though the operations have not yet been brought to the producing stage, it is hoped some time next year to determine definitely whether the tar sands can be economically developed as a source of oil. Some $850,000 is being spent by the Canadian Government on the project.

The most important development of the year has been the Canol project in the Fort Norman field of the Far North. Operations here started about the middle of 1942. Recent official figures place the field output for 1942 at 75,789 bbl., much higher than previously reported. Output was 89,929 bbl. during the first 6 months of 1943. Production figures have been unavail-

(Continued on page 201)

Honored by the WHITE STAR from UNCLE SAM


WAR DEPARTMENT
OFFICE OF THE UNDER SECRETARY
WASHINGTON, D.C.
11 December 1943
To the Men and Women
of the American Well & Prospecting Company
Corsicana, Texas
I am pleased to inform you that you have won
for the second time the Army-Navy Production Award for
meritorious services on the production front.
You have continued to maintain the high stand-
ard that you set for yourselves and which won you distinc-
tion more than six months ago. You may well be proud of
your achievement.
The White Star, which the renewal adds to your
Army-Navy Production Award flag, is the symbol of appre-
ciation from our Armed Forces for your continued and
determined effort and patriotism.
Sincerely yours,
Robert P. Patterson
Under Secretary of War
ARMY
E
NAVY
AMERICAN
WELL & PROSPECTING CO.
CORSICANA, TEXAS
December 14, 1943
Honorable Robert P. Patterson
Under Secretary of War
Pentagon Building
Washington, D. C.
Dear Sir,
It is with a feeling of great personal satisfaction that I am
permitted on behalf of the men and women of American Well &
Prospecting Company to express to you our sincere appreciation
of your recognition of our efforts, in awarding us the White
Star to be added to our Army-Navy Production Award Flag, which
we received about six months ago.
The addition of the White Star to our flag will serve as an
inspiration for our constant and continued efforts in the
production of war materials until the war is won.
Yours very truly,
J. E. Rotterdecker
J. E. Rotterdecker
President
JER:GS
Att Hall

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AMERICAN WELL & PROSPECTING CO.

CORSICANA, TEXAS

GUMBO BUSTER

ROCKY MOUNTAIN AREA

Rise in Drilling Reflects Record Breaking Discoveries

by Tolbert R. Ingram

DENVER, Colo.—Completions in the Rocky Mountain area, comprising Colorado, Wyoming, Montana and Northwest New Mexico, were 415 in 1943, which compares with 383 in 1942, an increase of 32 or 7.7 per cent. The number of oil wells was 263, a gain of 21 or 8 per cent. This narrow margin between the 2 years did not apply, however, to new production. The initial production of new wells was 81,464 bbl. in 1943, which compares with 46,428 bbl. in 1942, an increase of 35,036 bbl. or 43 per cent.

Wyoming accounted for most of the increase. The initial production for that state in 1943 being 66,972 bbl. against 29,469 bbl. in 1942, an increase of 37,503 bbl. per day or 55.9 per cent. The Wyoming increase came principally from the Elk Basin field, a Tensleep discovery in 1942 which was developed with 22 producers in 1943 with initial output of 47,239 bbl. or 70.5 per cent of the state's total.

The number of dry holes in the area increased from 66 in 1942 to 113 in 1943, a gain of 47 or 41.6 per cent. Montana was responsible for this showing, more wildcats being drilled in that state than in the remainder of the area combined. A decrease in gas wells from 80 in 1942 to 39 in 1943 reflects the reduced development rate in the Bowdoin gas field in Montana.

The area chalked up 11 oil discoveries, of which 7 were primary and 4 were in formations other than previous producing horizons; 4 gas discoveries, all in new territory, and 8 extensions of producing fields; a total of 23 as against 11 in 1942.

Steamboat Butte Discovery

The major primary discovery of the year was made by British-American Oil Producing Co. on Steamboat Butte, Fremont County, Wyoming, in the Sundance formation. Its initial production was 623 bbl., and during the year two other wells were completed, the three averaging 460 bbl. per day initial. An equally important primary discovery was made by Continental Oil Co. on the Gebo dome, Hot Springs County, Wyoming, where one well was completed in the Embar for 90 bbl. an hour through a bean, from 107 ft. of saturated sand, but was rated at a much higher capacity from the entire section. The Steamboat Butte discovery showed oil or gas in all important sands down to the Sundance, while the Gebo well showed water in the Tensleep below the Embar.

The Elk Basin discovery in the Tensleep took place in December 1942 but oil was discovered in a lower section of that horizon in 1943.

The only primary discovery in Colorado was at Clark's Lake, in Larimer County, by Amerada Petroleum Corp., in the Muddy sand; the lower horizons down to and including the Sundance were not commercial. At the end of the year the Amerada well had not been tested, but it is expected to make a small well.

Little Buffalo Basin, Wyoming, likewise had not been given a production test at the close of the year, but the best result from swabbing the discovery well was 135 bbl. in 24 hours. Horse Creek had a small well in the Muddy which was passed up while drilling a deep test, and it is not expected to develop into anything of major importance. The Frannie and Oregon Basin discoveries were in the Madison lime. Additional drilling indicates that the first named will be limited in area, while the possibilities of the other are not yet fully indicated.

The three primary discoveries in Montana, at Gage, East Utopia and Brady, were all small and indicative of future possibilities rather than of immediate importance.

The four gas discoveries, likewise, were not of major importance. The best one, at Douglas Creek, in Colorado, tested 9,700,000 cu. ft. a day. The other three were in Montana, the best at Ingomar for 8,200,000 cu. ft. The eight extensions in old fields were at North McCallum, in Colorado; on the west and northwest

PRODUCTION AND RESERVES—ROCKY MOUNTAIN AREA
(In thousands of barrels)

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
WYOMING				
Big Muddy	388	27,814	2,826	140
Byron	2,416	9,929	10,071	30
Circle Ridge	232	292	1,508	10
Cole Creek	412	1,291	4,809	31
Dallas-Derby	150	3,525	1,405	34
Elk Basin	2,093	13,680	279,020	165
Frannie	1,079	7,876	10,124	30
Garland	398	5,883	4,117	18
Grass Creek	1,352	32,562	18,338	340
Hamilton Dome	520	6,437	8,563	33
Hudson-Lander	86	2,405	595	35
La Barge	614	8,798	6,202	141
Lance Creek	7,439	56,510	52,490	220
Lost Soldier	1,981	27,291	21,709	48
Maloney	301	1,476	2,824	9
Maverick Springs	580	1,874	6,276	35
Medicine Bow	230	4,269	1,931	7
Mule Creek	111	1,658	1,042	42
Notches	110	317	883	5
Oregon Basin	5,022	29,782	52,718	108
Osage	184	5,168	2,532	192
Pilot Butte	461	1,230	1,070	13
Poison Spider - S. Casper	267	4,320	2,180	36
Quealy	160	1,524	1,976	17
Rock River	918	22,614	8,086	52
Salt Creek	4,806	303,060	56,940	1,780
Steamboat Butte	203	203	3,637	3
Wertz	2,039	8,622	36,378	23
Miscellaneous	114	7,827	7,703	137
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MONTANA				
Cat Creek	119	14,880	920	118
Cut Bank	5,339	36,898	79,102	745
Kevin-Sunburst	1,847	43,573	19,427	1,062
Pondera	206	6,425	1,575	113
Dry Creek, etc.	130	3,757	2,293	37
Total	7,641	105,533	103,317	2,080
COLORADO				
Ft. Collins-Wellington	106	8,598	1,031	19
Hiawatha	164	2,836	2,136	8
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Price	388	4,000	3,638	9
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Miscellaneous	145	17,450	1,865	65
Total	2,431	74,564	30,759	165

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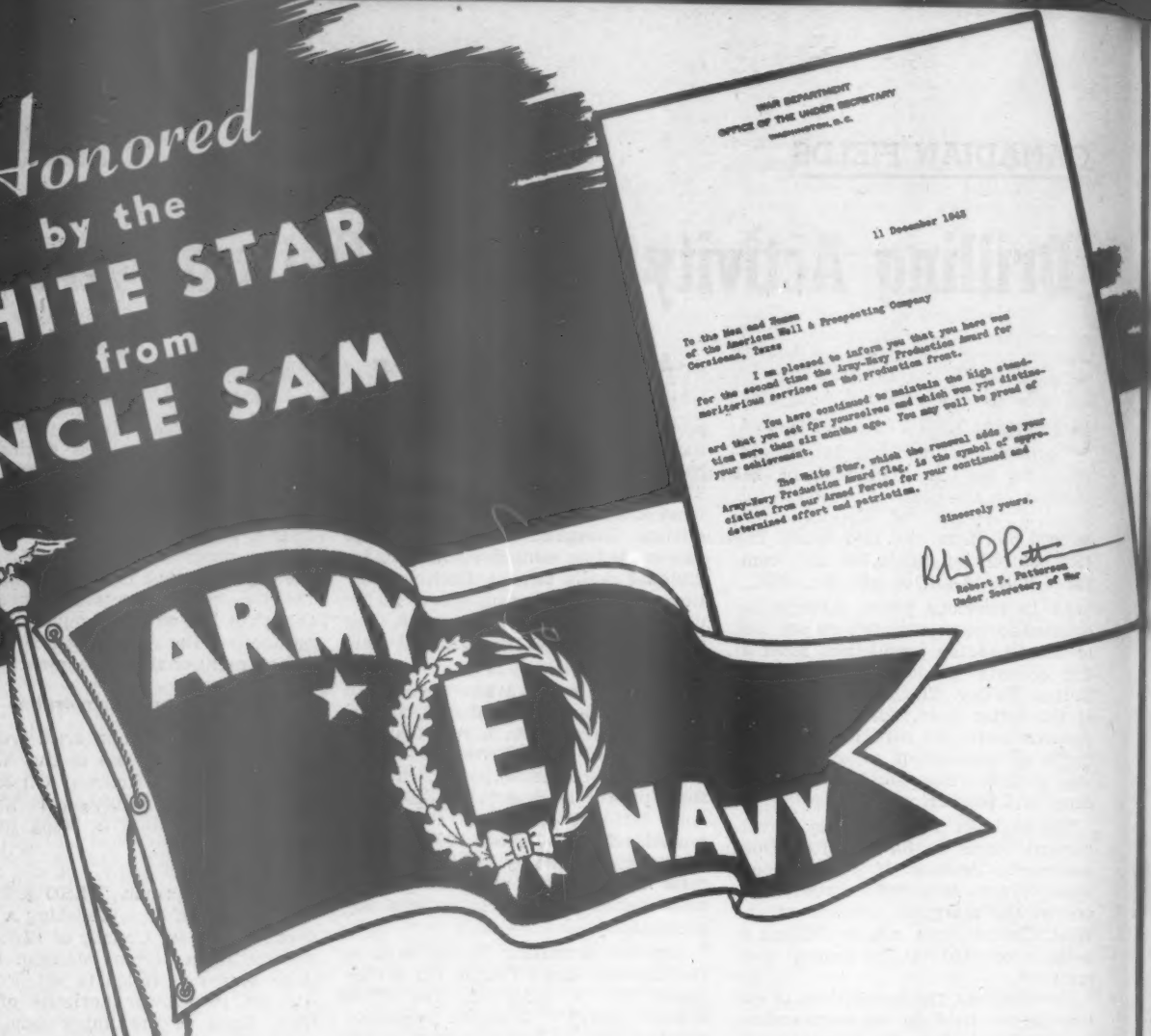

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OFFICE OF THE UNDER SECRETARY
WASHINGTON, D. C.

11 December 1943

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of the American Well & Prospecting Company
Corsicana, Texas

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You have continued to maintain the high standard that you set for yourselves and which won you distinction more than six months ago. You may well be proud of your achievement.

The White Star, which the renewal adds to your Army-Navy Production Award flag, is the symbol of appreciation from our Armed Forces for your continued and determined effort and patriotism.

Sincerely yours,

Robert P. Patterson
Under Secretary of War

AMERICAN WELL & PROSPECTING COMPANY
CORSICANA, TEXAS
December 14, 1943

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Under Secretary of War
Pentagon Building
Washington, D. C.

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The addition of the White Star to our flag will serve as an inspiration for our constant and continued efforts in the production of war materials until the war is won.

Yours very truly,

J. E. Ritterbusher
President

JER:GP
AIR MAIL

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Total	2,431	74,564	30,759	165

sides at Kevin-Sunburst in Montana; at the south end of Cut Bank; at Pilot Butte, Oregon Basin and Lost Soldier, in Wyoming; and at Midway, in Montana.

COLORADO

Summary of Wells Completed in 1943

Field—	Comp.	Oil	Prod.	Gas	Dry
Alamo-St. Mary's	1	0	0	0	1
Barela	1	0	0	0	1
Beaver Creek	1	0	0	0	1
Boulder	1	0	0	0	1
Buckingham	1	0	0	0	1
Chromo	1	0	0	0	1
Douglas Creek	1	0	0	1	0
Dry Lake	1	0	0	0	1
East Hiawatha	1	0	0	0	1
Little Poose Crk.	1	0	0	0	1
North McCallum	1	1	102	0	0
Rangely	16	8	166	0	8
S. Douglas Creek	1	0	0	0	1
Wilson Creek	2	2	560	0	0
Wray	1	0	0	0	1
Total	31	11	918	1	19

Completions by Months

Month—	Comp.	Oil	Gas	Dry	Footage
January	1	0	0	1	7,006
February	1	0	0	1	1,350
March	2	1	0	1	9,421
April	2	1	0	1	2,181
May	0	0	0	0	.....
June	1	1	0	0	660
July	10	6	1	3	23,850
August	2	0	0	2	2,500
September	0	0	0	0	.....
October	3	0	0	3	9,663
November	2	0	0	2	8,729
December	7	2	0	5	17,621
Total	31	11	1	19	82,990

THOMAS
FLEXIBLE
COUPLINGS
5 exclusive features:
NO BACKLASH
NO WEAR
NO LUBRICATION
NO THRUST
FREE END FLOAT
These are the five essential features for a permanent care-free installation not found in any other make or type of flexible coupling.
Write for our new catalog and see how THOMAS can solve your coupling problems. It contains complete specifications on all types of couplings.
"BUILT TO LAST A LIFETIME"
THOMAS
THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA
C-1

MONTANA

Summary of Wells Completed in 1943

Field—	Comp.	Oil	Prod.	Gas	Dry
Aloe district	3	0	0	0	3
Bowdoin	11	0	0	10	1
Brady	1	1	25	0	0
Cedar Creek	9	0	0	9	0
Clark's Fork	1	0	0	0	1
Cut Bank	90	74	9,421	2	14
Dunkirk	3	1	3	0	2
East Kevin	5	0	0	1	4
East Shelby	2	0	0	0	2
East Utopia	1	1	20	0	0
Gage	1	1	25	0	0
Hagen	1	0	0	0	1
Ingomar	1	0	0	1	0
Kevin-Sunburst	91	69	3,898	1	21
Midway	3	1	74	0	2
Pondera Block	3	0	0	0	3
Red Creek	4	0	0	0	4
South Shelby	3	0	0	2	1
Sweetgrass	1	0	0	0	1
Teton Block	2	0	0	0	2
West Kevin	1	0	0	0	1
Whitlash	1	0	0	1	0
Willshaw Coulee	2	0	0	0	2
Total	240	148	13,466	27	65

Completions by Months

Month—	Comp.	Oil	Gas	Dry	Footage
January	18	10	6	2	34,408
February	8	5	1	2	18,369
March	14	9	3	2	30,953
April	15	11	2	2	34,222
May	23	14	3	6	47,648
June	20	12	3	5	43,380
July	24	16	0	8	53,588
August	25	13	3	9	50,340
September	25	14	1	10	61,867
October	35	19	2	14	78,567
November	20	13	3	4	48,922
December	13	12	0	1	31,060
Total	240	148	27	65	533,324

WYOMING

Summary of Wells Completed in 1943

Field—	Comp.	Oil	Prod.	Gas	Dry
Badger Basin	1	1	100	0	1
Bell Springs	1	0	0	0	1
Big Hollow	1	0	0	0	1
Big Muddy	1	1	25	0	0
Big Piney	1	0	0	1	0
Bunker Hill	1	0	0	0	1
Brenning Basin	1	0	0	0	1
Byron	8	8	2,227	0	0
Cole Creek	11	10	1,054	0	1
Dewey	1	0	0	0	1
Elk Basin	22	22	47,239	0	0
Frannie	3	3	1,020	0	0
Gebo	1	1	2,160	0	0
Gooseberry	1	0	0	0	1
Hot Six	1	0	0	0	1
Horn Valley	1	0	0	0	1
Horse Creek	2	1	40	0	1
Iron Creek	1	1	10	0	0
La Barge	3	2	126	0	1
Lance Creek	7	7	743	0	0
Lost Soldier	3	3	1,237	0	0
McCullough's Peak	1	0	0	0	1
Middle Allen Lake	1	0	0	0	1
Middle Baxter Basin	1	0	0	1	0
Maverick Springs	3	3	315	0	0
Moorcroft	1	0	0	0	1
Newcastle	1	0	0	0	1
Notches	1	1	75	0	0
Oregon Basin	26	26	7,764	0	0
Osage	2	0	0	0	2
Pilot Butte	4	1	399	1	2
Plunkett	1	0	0	0	1
Poison Spider	1	1	60	0	0
Salt Creek	3	3	680	0	0
Shawnee	1	1	30	0	0
Sherrard	1	0	0	0	1
S. Baxter Basin	3	0	0	3	0
Spring Creek	1	0	0	0	1
Steamboat Butte	3	3	1,380	0	0
Wertz	3	2	273	0	1
S. Piney Creek	2	1	15	0	1
Total	133	102	66,972	6	25

Completions by Months

Month—	Comp.	Oil	Gas	Dry	Footage
January	16	11	1	4	57,811
February	7	6	0	1	20,544
March	3	1	0	2	12,081

Month—	Comp.	Oil	Gas	Dry	Footage
April	13	10	0	3	58,746
May	12	11	0	1	50,439
June	4	3	0	1	18,890
July	17	12	2	3	68,611
August	18	13	1	4	79,935
September	13	12	0	1	62,344
October	14	11	0	3	53,594
November	9	7	2	0	43,920
December	7	5	0	2	30,278
Total	133	102	6	25	557,193

Canadian Fields

(Continued from page 197)

able since last midyear.

The latest information on Canol drilling results shows a total of 27 producers, including the 4 original wells. Of 26 wells drilled, 19 in the proven area, and 4 outlying wells, were producers. Three were dry holes. Depths vary from 1,000 to 2,100 ft. Production of 36-gravity oil comes from the Devonian limestone.

ALBERTA

Summary of Wells Completed During 1943

Field—	Comp.	Oil	Prod.	Gas	Dry
Turner Valley:					
Southwest	3	3	1,778	0	0
West Central	2	2	947	0	0
North	9	9	6,253	0	0
North Extension	9	9	7,065	0	0
Gas area	20	0	0	20	0
Vermilion	19	15	559	1	3
Taber	7	3	690	0	4
Kinsella	10	0	0	7	3
Lloydminster	1	1	50	0	0
Medicine Hat	2	0	0	2	0
Athabaska	2	0	0	1	1
Pouce Coupe	1	0	0	1	0
Foothills	5	1	133	1	3
Border	4	0	0	0	4
Central Plains	3	0	0	0	3
Total	97	43	17,475	33	21

ONTARIO

Gas Drilling During 1943

Township—	Comp.	Gas	Prod.*	Dry
Calstor	7	6	197	1
Camden	2	1	175	1
Canboro	1	0	0	1
Charlotteville	3	2	90	1
Chatham	1	1	480	0
Dawn	6	3	1,400	3
Delaware	1	0	0	1
Dereham	1	0	0	1
Dunn	2	1	15	1
Harwich	1	0	0	1
Malahide	6	0	0	6
Middleton	1	1	65	0
Moulton	2	2	60	0
North Cayuga	23	19	1,042	4
North Walsingham	2	0	0	2
Oneida	40	30	1,290	10
Onondaga	1	0	0	1
Rainham	1	0	0	1
Romney	1	0	0	1
Romney (Lake Erie)	1	1	630	0
Sherbrooke	1	0	0	1
Sombra	2	0	0	2
South Cayuga	15	13	706	2
South Dorchester	1	0	0	1
South Norwich	2	0	0	2
Tilbury, East	4	4	149	0
Townsend	15	8	430	7
Tuscarora	4	1	50	3
Wainfleet	4	3	49	1
Walpole	26	18	556	8
Westminster	3	0	0	3
Windham	2	0	0	2
Woodhouse	10	6	451	4
Zone	9	3	1,794½	6
Total	201	123	9,531½	78

*Thousands of cubic feet daily.

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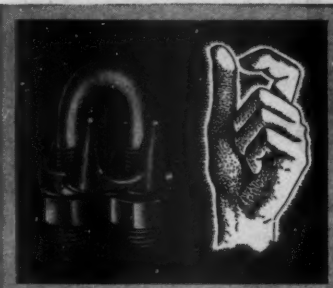
SAVE METALS • SAVE TIME
PREVENT ACCIDENTS

Save Metals—25% fewer clips do the job better.
Save Time—fewer clips to put on—nuts tighten faster, with any type wrench.
Prevent Accidents—can't be put on backwards.



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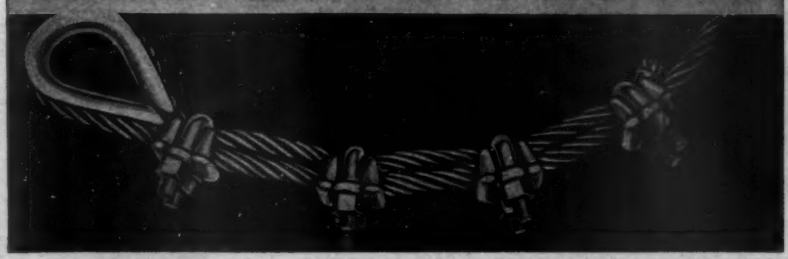

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LAP-JOINT STUB ENDS

For making connections to boilers, pumps, valves and other flanged outlets (and where piping must be frequently cleaned or inspected for corrosion), Midwest Lap-Joint Stub Ends have a tremendous advantage over flanges that are welded to the pipe (see drawings at right above). The swivel flange on the Stub End makes it unnecessary to accurately line up the bolt holes before welding; "setting up" is simple and quick because no special clamps or jigs are required to hold the face of the flange absolutely perpendicular to the axis of the pipe. The result is a real saving in time and cost of welding.

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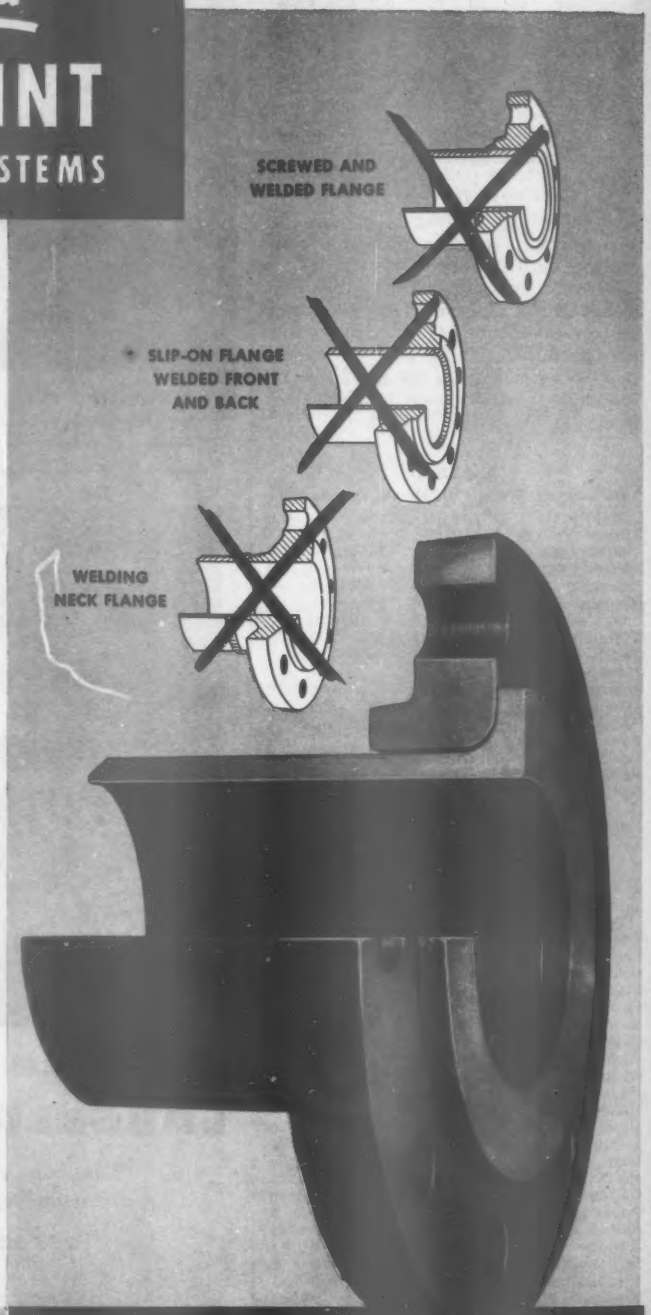
See Bulletin WF-41 for complete data regarding Midwest Lap-Joint Stub Ends . . . and the many other Midwest Welding Fittings that simplify and save on welded piping.



MIDWEST PIPING & SUPPLY CO., Inc.

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MIDWEST WELDING FITTINGS IMPROVE DESIGN AND REDUCE PIPING COSTS

Exploratory Wells Rise While Field Development Operations Fall Sharply

A SHARP drop in well completions in coastal Louisiana in 1943 drew the total down to 360, compared with 434 in the preceding year. Initial production revealed a similar shrinkage, 47,023 bbl. daily, contrasted with 67,778 in 1942. The declines were registered in established fields, for wildcat operations recorded a moderate rise, 53 completions being reported in 1943, against 48 in 1942. Wildcat wells added 3,321 bbl. of oil or condensate daily to Louisiana production. Failure to follow up discoveries with further drilling resulted in uncertainties at the close of the year as to the extent of the reserves which the new wells had added.

The Pine Prairie and Vinton fields were close competitors in point of wells drilled, but while the latter contributed only routine additions to yield, Pine Prairie recorded the first Wilcox production in that area, besides opening up Sparta production on the southeast flank of the dome. It fell to Roy Lee to get a 166-bbl. well in the Wilcox at his 1 Crowell-Spencer Lumber Co. The Sparta sand was tapped by C. & I. Production Co. 1 Haas through deepening an old hole which had been marked up as dry and abandoned a year earlier. Of the 17 wells completed in the Pine Prairie field 15 were successes, good for an average daily production of 252 bbl. There were 19 completions in the Vinton field.

Unlike most of the new coastal Louisiana areas opened to production, the Bear field, in Beauregard Parish, saw a continuation of drilling operations, with the result that some more good wells were added. The discovery, General Crude Oil Co. 1 Baldwin,

PRODUCTION AND RESERVES—SOUTHWEST LOUISIANA

(In thousands of barrels)

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Acadia Parish:				
Bayou Mallet	82	600	600	4
Bosco	1,094	24,428	6,572	41
Jennings	3,463	84,134	30,866	107
North Crowley	1,710	8,335	13,665	36
Richie	246	654	2,346	15
Tepetate and North	910	14,473	7,527	48
Miscellaneous	65	277	573	6
Total	7,570	130,901	62,149	257
Avoyelles Parish:				
Eola	2,835	17,747	22,253	87
Beauregard Parish:				
Bancroft	213	3,325	1,675	25
Bear	112	112	888	5
Neale	1,332	3,392	12,608	27
Miscellaneous	1	1	99	1
Total	1,658	6,830	15,270	58
Calcasieu Parish:				
Gillis	495	22,547	4,573	32
Iowa	2,948	51,693	22,907	62
Lockport	258	15,278	2,022	21
Starks	198	3,677	1,583	25
Sulphur	750	17,470	6,630	63
Vinton	606	44,127	4,873	60
Miscellaneous	61	8,578	542	16
Total	5,316	163,370	43,130	279
Cameron Parish:				
Black Bayou	1,094	10,733	8,267	22
Cameron Meadows	657	9,800	5,350	31
Chalkley	1,498	5,869	10,131	29
Creole	220	2,189	3,411	8
East Hackberry	1,797	31,678	15,522	58
Grand Lake	959	5,336	7,864	22
Sweet Lake	644	6,776	5,224	17
West Hackberry	1,945	11,714	16,286	64
Miscellaneous	14	138	270	6
Total	8,828	84,233	72,125	257
Evangeline Parish:				
Pine Prairie	1,424	2,552	11,348	41
Ville Platte	4,491	25,721	43,279	248
Miscellaneous	6	6	194	2
Total	5,921	28,279	54,821	291
Iberia Parish:				
Avery Island	173	195	1,905	6
Bayou Pigeon	145	729	771	4
Fausse Point	171	341	1,559	6
Jefferson Island	280	1,417	2,083	9
New Iberia	2,615	29,591	20,409	84
Vermilion Bay	111	502	698	3
Miscellaneous	1	1	99	1
Total	3,496	32,776	27,424	113
Jefferson Davis Parish:				
Lake Arthur	114	1,218	782	6
Roanoke	604	10,357	4,643	19
Woodlawn	951	4,527	8,573	6
Miscellaneous	124	1,124	816	25
Total	1,793	17,226	14,814	56
Rapides Parish:				
Cheneyville	824	4,491	7,009	13
St. Landry Parish:				
Port Barre	1,237	12,059	10,941	52
St. Martin Parish:				
Anse La Butte	2,309	7,305	19,695	67
Happytown	142	570	930	2
Lake Chicot	564	826	4,275	10
Plumb Bob	74	423	777	3
West Lake Verret	848	2,680	7,320	22
Miscellaneous	132	2,603	1,237	9
Total	4,069	14,407	34,234	113
St. Mary Parish:				
Bateman Lake	99	1,357	843	8
Bayou Sale	1,897	3,903	16,017	30
Charenton	1,123	10,916	9,684	105
Horseshoe Bayou	455	2,218	3,152	8
Jeanerette and North	656	11,007	6,113	20
West Coyte Blanche	661	1,584	5,796	15
Miscellaneous	2	6	94	1
Total	4,893	29,981	41,699	187
Vermilion Parish:				
Abbeville	90	824	769	9
East White Lake	560	858	6,542	10
Erath	211	593	1,907	10
Gueydan	1,243	3,875	9,125	24
West Gueydan	261	958	2,042	9
Total	2,355	7,108	20,412	62
Miscellaneous parishes	36	57	279	2
Total Southwest La.	50,831	549,485	426,560	1,827
Total Louisiana Gulf	95,541	813,902	812,171	2,880

completed in April, showed initial daily production of 151 bbl. from the Frio sand. Phillips Petroleum Co. started an east offset to the discovery and in June brought in its 1 First National Bank of Beaumont, with initial yield of 348 bbl. Three of the six tests drilled in the field up to the end of the year were failures, but the three producers had total daily output of 729 bbl., with further development in prospect.

The Bear area had held the interest of oil men for years, but General Crude's venture was the first conclusive test. This marked the third oil field in Beauregard Parish. As the productive zone is at moderate depth, around the 6,500-ft. level, with drilling costs relatively low, it was believed that 1944 would witness further development. Humble Oil & Re-

(Continued on Page 207)

LOUISIANA GULF COAST

Summary of Wells Completed in 1943

Parish—	Comp.	Oil	Prod.	Gas	Dry
Anse La Butte	7	2	242	0	5
Arnaudville	1	1	65	0	0
Avery Island	6	5	1,246	0	1
Barataria	1	0	0	0	1
Bastian Bay	1	0	0	0	1
Baton Rouge	3	3	629	0	0
Bay de Chene	1	0	0	0	1
Bayou Blue	4	1	149	0	3
Bayou Choctaw	4	1	235	0	3
Bayou Couba	5	3	666	0	2
Bayou des Allemands	4	3	599	0	1
Bayou Sale	11	9	2,248	0	2
Bear	6	3	729	0	3
Belle Isle	2	0	0	0	2
Big Lake	1	1	140	0	0
Black Bayou	1	1	290	0	0
Branch	2	2	30	0	0
Bully Camp	14	0	0	1	13
Caillou Island	3	3	398	0	0
Cameron Meadows	3	1	117	0	2
Chacahoula	10	6	930	0	4
Chalkley	2	0	0	0	2
Charenton	3	0	0	1	2
Cheneyville	1	0	0	0	1
Convent-Hester	4	1	128	1	2
Deer Island	2	0	0	1	1
Delacroix Island	4	4	641	0	0
Delta Farms	9	9	2,193	0	0
Dog Lake	1	0	0	0	1
East Hackberry	3	3	603	0	0
East Whitelake	4	4	1,378	0	0
Egan	1	1	105	0	0
Erath	2	0	0	2	0
Fausse Point	2	2	473	0	0
Four Isle	3	0	0	0	3
Fresh Water Bayou	1	0	0	1	0
Garden Island Bay	4	3	327	0	1
Gibson	8	7	2,228	1	0
Golden Meadow	2	0	0	0	2
Grand Bay	4	3	606	0	1
Gueydan	4	3	416	0	1
Hope Villa	1	1	335	0	0
Hayes	1	1	25	0	0
Horseshoe Bayou	3	0	0	2	1
Iowa	1	0	0	0	1
Jefferson Island	3	2	894	0	1
Jennings	2	0	0	0	2
Kenilworth	1	0	0	0	1
Lafitte	1	0	0	0	1
La Fourche Crossing	1	1	162	0	0
Lake Chicot	4	2	535	0	2
Lake de Cade	2	1	97	0	1
Lake Fausse	1	1	259	0	0
Lake Long	1	1	325	0	0
Lake Pelto	2	2	475	0	0
Lake Salvador	2	2	571	0	0
Leeville	6	4	853	1	1
Lirette	1	0	0	1	0
Little Bayou	3	0	0	0	3
Mystic	1	1	182	0	0
Napoleonville	1	1	192	0	0
Neale	7	7	2,020	0	0
North Crowley	1	1	240	0	0
North Jeanerette	2	1	292	0	1
Paradis	14	13	3,920	0	1
Pecan Island	3	2	54	1	0
Perkins	1	1	165	0	0
Pine Prairie	17	15	3,880	0	2
Port Barre	6	4	567	0	2
Potash	3	3	1,030	0	0
Quarantine Bay	2	2	568	0	0
Riceland	4	1	65	0	3
Reddell	2	2	514	0	0
Richie	3	2	185	0	1
Roanoke	6	3	393	0	3
Rosedale	1	1	215	0	0
St. Gabriel	2	1	37	0	1
St. James	3	1	80	0	2
Shuteston	2	1	146	0	1
South Houma	1	0	0	0	1
South Lewisburg	1	1	149	0	0
South Roanoke	1	0	0	0	1
Strake	2	0	0	0	2
Sulphur Mines	1	0	0	0	1
Tepetate	2	1	98	0	1
Thornwell	1	0	0	0	1
Vacherie	1	1	50	0	0
Valentine	1	0	0	0	1
Venice	4	3	748	0	1
Vermilion Bay	1	1	19	0	0
Ville Platte	8	7	1,371	0	1
Vinton	19	17	2,951	0	2
West Bay	2	2	526	0	0
West Cote Blanche Bay	3	3	667	0	0
West Gueydan	2	2	317	0	0
West Hackberry	4	3	2,565	0	1
West Lake Verret	1	1	130	0	0
West Mermentau	1	0	0	0	1
Westwego	1	0	0	0	1
Whitelake	1	1	247	0	0
Unnamed (St. Martin Parish)	1	1	65	0	0
Wildcat failures	30	0	0	0	30
Total	360	210	46,897	13	137

INFORMATION

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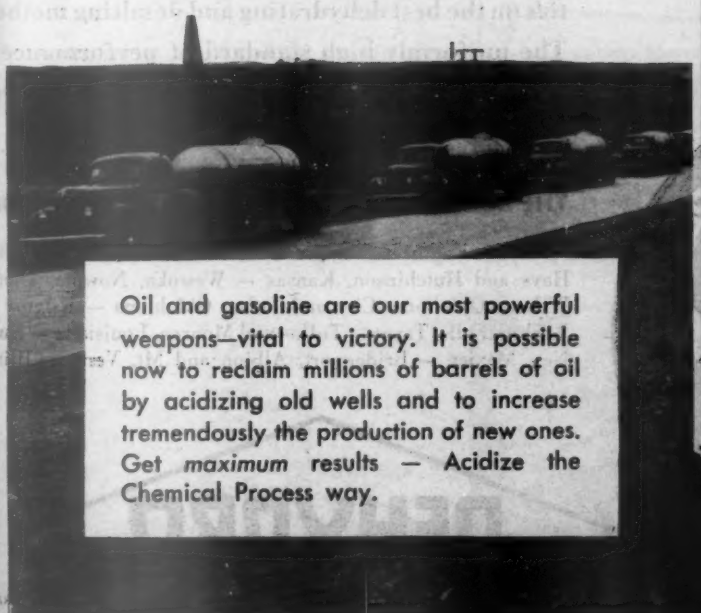
1-JV-4

PRODUCTION AND RESERVES—SOUTHEAST LOUISIANA

(In thousands of barrels)

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Ascension Parish:				
Darrow	433	5,933	2,592	17
Miscellaneous	33	1,224	176	5
Total	476	7,157	2,768	22
East Baton Rouge Parish:				
University	2,907	14,899	33,876	77
Miscellaneous	18	18	82	1
Total	2,925	14,917	33,958	78
Iberville Parish:				
Bayou Blue	792	2,447	7,553	33
Choctaw	168	4,006	1,494	17
St. Gabriel	1,734	3,617	16,383	27
White Castle	1,295	7,392	11,108	21
Miscellaneous	6	11	89	1
Total	3,996	17,473	36,627	99
Jefferson Parish:				
Barataria	1,123	3,634	11,366	21
La Fitte	4,714	35,720	44,580	58
Westwego	118	257	943	4
Miscellaneous	125	163	1,837	3
Total	6,080	39,834	58,726	86
La Fourche Parish:				
Chacahoula	929	2,900	8,600	21
Delta Farms	881	1,379	8,141	17
Golden Meadow	3,631	17,750	28,760	142
La Fourche Crossing	151	650	1,350	5
Lake Long	820	3,247	7,253	18
Leeville	1,264	25,407	9,793	75
Raceland	771	3,145	6,455	13
Valentine	150	5,564	836	18
Miscellaneous	26	267	233	2
Total	8,823	60,309	71,421	311
Plaquemines Parish:				
Delacroix Island	114	162	1,938	4
Garden Island Bay	1,367	7,351	8,649	35
Grand Bay	2,507	8,305	20,695	40
Lake Washington	150	3,355	1,245	7
Potash	689	2,336	5,914	16
Quarantine Bay	2,552	9,702	21,298	30
Stella	237	644	3,156	6
Venice	2,145	6,849	17,351	29
West Bay	893	2,061	7,189	16
Miscellaneous	22	299	201	8
Total	10,676	40,864	86,636	200
St. Charles Parish:				
Bayou des Allemands	322	953	2,747	13
Lake Salvador	1,015	2,393	8,607	19
Paradis	4,181	7,834	48,166	65
Total	5,518	11,180	59,250	97
St. James Parish:				
La Pice	175	490	1,310	5
Miscellaneous	26	332	168	1
Total	201	822	1,478	6
Terrebonne Parish:				
Bay Ste. Elaine	123	947	1,053	10
Caillou Island	1,537	35,557	14,443	43
De Large	99	293	807	2
Dog Lake	444	3,147	3,353	10
Gibson and E and NE	2,646	9,127	25,873	39
Lake Barre	169	17,851	1,149	22
Lake Pelto	410	2,894	3,106	16
Lirette	309	453	1,297	7
Miscellaneous	97	799	901	4
Total	6,034	71,068	51,982	143
West Baton Rouge Parish:				
Port Allen	159	422	1,278	4
Miscellaneous parishes	122	391	1,487	7
Total Southeast La.	44,810	364,437	385,611	1,053

Reclaim and Increase Vital "Ammunition" —by Acidizing . . . . !



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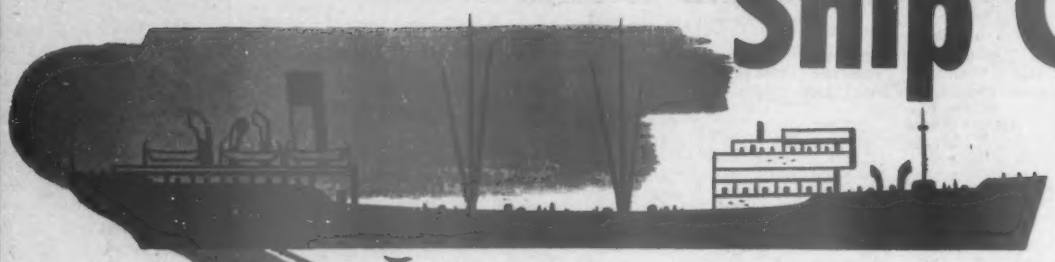

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ASK THE MAN IN THE GREEN CAR

fining Co., Magnolia Petroleum Co., Shell Oil Co., Inc., and Gulf Refining Co. are among companies which have holdings in the vicinity of the discovery.

Opening of the Reddell pool in Evangeline Parish in November gave promise that active drilling might be seen in that area. The discovery, 3 Pardee, a joint project of Humble and Continental Oil Co., flowed 156 bbl. daily from the Sparta. A second well, finished in the same month, started off with a daily output of 358 bbl. Production is from around the 12,000-ft. level.

The Reddell district had been eyed with interest for years by major operators, and geophysical surveys pointed to the presence of oil. Humble, Continental, Tide Water Associated Oil Co. and Amerada Petroleum Corp. have acreage in the vicinity of the discovery. Interests represented by Col. David Haas, of Bunkie, La., have the largest holdings, controlling some 1,900 acres. Several deep dry holes had been drilled in the area.

Deepest oil-field production in the world was established by Union Producing Co. et al at 1 Fitzpatrick-Vizard, in the De Large field, Terrebonne Parish. The well was drilled to total depth of 13,563 ft. and plugged back to 13,502 ft., where it flowed 5,970,000 cu. ft. of gas daily.

LOUISIANA GULF COAST

Completion by Months

Month—	Comp.	Oil	Gas	Dry	Footage
January	31	19	4	8	278,586
February	19	9	1	9	161,181
March	25	15	0	10	228,873
April	24	13	0	11	210,390
May	35	23	0	12	329,173
June	35	18	1	16	276,420
July	39	20	1	18	325,204
August	29	14	1	14	242,653
September	29	18	1	10	229 336
October	27	13	4	10	248,321
November	33	22	0	11	309,875
December	34	26	0	8	297,515
Total	360	210	13	137	3,137,527

LOUISIANA GULF COAST

Summary of Wildcats Completed in 1943

Parish—	Comp.	Oil	Prod.	Gas	Dry
Acadia	5	4	351	0	1
Assumption	2	1	192	0	1
Baton Rouge	1	1	136	0	0
Beauregard	4	2	333	0	2
Calcasieu	4	0	0	0	4
Cameron	6	2	257	0	4
East Baton Rouge	2	1	335	0	1
Evangeline	2	2	396	0	0
Iberia	1	0	0	0	1
Iberville	1	1	215	0	0
Jefferson Davis	1	0	0	0	1
La Fourche	1	0	0	0	1
Livingston	1	0	0	0	1
Orleans	1	0	0	0	1
Rapides	2	0	0	0	2
St. James	1	1	80	0	0
St. Landry	4	2	237	0	2
St. Martin	2	2	357	0	0
St. Mary	3	1	292	0	2
Terrebonne	4	0	0	0	4
Vermilion	3	2	140	1	0
Vernon	1	0	0	0	1
West Baton Rouge	1	0	0	0	1
Total	53	22	3,321	1	30

APPALACHIAN FIELDS

Deep Production Search Continues Despite Failures

PITTSBURGH, Pa.—Results in the lower eastern fields during 1943 were not highly encouraging. Completions in southwest Pennsylvania and West Virginia declined 8.3 per cent but as a marked trend of operations, oil completions declined 29.7 per cent against a decline in gas completions of only 5.1 per cent. Initial new oil production declined 70 per cent and the total number of dry holes remained constant at 200.

During the year, continued exploring for deeper producing horizons, the lower Devonian (Onondaga-Corniferous limestone and Oriskany sands) or in rare cases the Silurian (Newburk, Clinton and Medina) resulted in mostly geological information and little if any commercial production. This work, however, is being continued because of shortages in both Pennsylvania Grade oil and gas for the industrial load.

WEST VIRGINIA

During the year an interesting gas development was carried on and is being continued in Raleigh and Wyoming counties in southern West Virginia where considerable Big lime gas has been shut in as well as some from the Ravenscliff sand. Lately some Berea gas has been developed.

SOUTHWEST PENNSYLVANIA

Summary of Wells Completed in 1943

Month—	Comp.	Oil	Prod.	Gas	Dry
January	26	0	0	22	4
February	13	0	0	12	1
March	25	0	0	22	3
April	17	0	0	14	3
May	28	2	34	17	9
June	32	2	7	22	8
July	24	1	4	21	2
August	30	1	5	19	10
September	32	0	0	22	10
October	32	0	0	24	8
November	23	1	4	17	5
December	31	0	0	21	10
Total 1943	313	7	54	233	73
Total 1942	320	9	203	247	64
Difference	7	2	149	14	9

WEST VIRGINIA

Summary of Wells Completed in 1943

Month—	Comp.	Oil	Prod.	Gas	Dry
January	32	2	3	22	8
February	49	14	137	29	6
March	44	6	47	31	7
April	51	6	61	39	6
May	48	5	73	37	6
June	62	8	51	45	9
July	70	8	27	51	11
August	64	5	44	45	14
September	94	7	65	68	19
October	73	7	51	54	12
November	87	8	92	64	15
December	80	12	48	60	8
Total 1943	754	88	699	545	121
Total 1942	844	126	2,366	573	146
Difference	90	38	1,667	28	25

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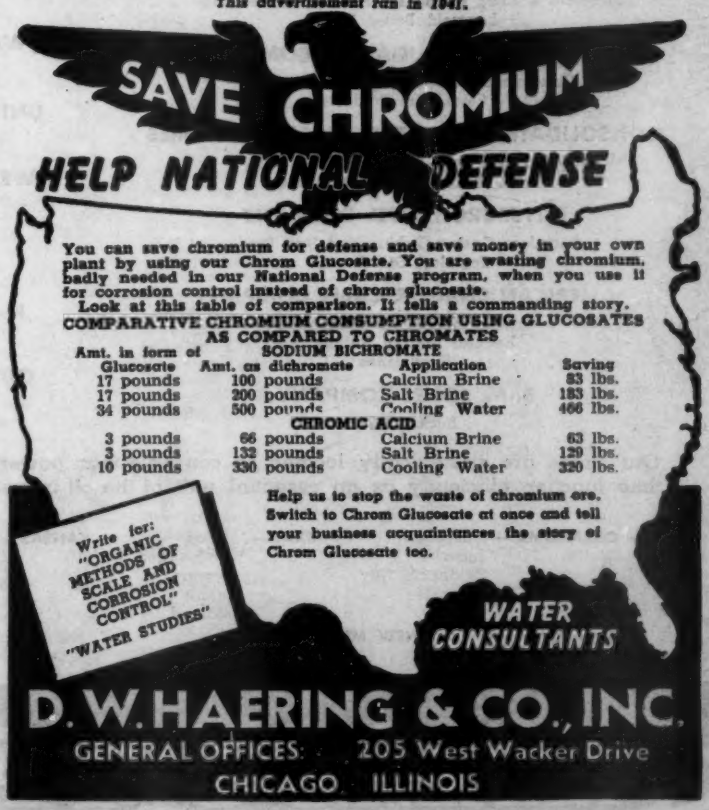
This advertisement ran in 1941.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Amt. in form of Glucosate | SODIUM BICHROMATE Amt. as dichromate | Application | Saving
17 pounds | 100 pounds | Calcium Brine | 83 lbs.
17 pounds | 200 pounds | Salt Brine | 183 lbs.
34 pounds | 500 pounds | Cooling Water | 466 lbs.
CHROMIC ACID
3 pounds | 66 pounds | Calcium Brine | 63 lbs.
3 pounds | 132 pounds | Salt Brine | 129 lbs.
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Anadarko Promising

by Carl Hoot

AGAIN during 1943 Oklahoma operators produced more oil than was found. The daily average of around 350,000 bbl. the first of the year had dropped off nearly 25,000 bbl. by September. Total production for the year was 120,559,000 bbl. and the new reserves were estimated at 35,075,000 bbl. Both field and wildcat completions remained at last year's levels. There were 10 fewer discovery oil wells but an increase of 8 in the total of completed producers.

At this time the state's future development seems to lie in a region just east of the Anadarko basin and west of the Nemaha ridge. Recent developments at Mid-Continent Petroleum Corp.'s West Moore discovery and the two deep tests being drilled by Carter Oil Co. in McClain County have stimulated interest in this area and have caused one of the largest leasing campaigns the state has witnessed in the past 2 years. The Washita Mountain Range of southwestern Oklahoma should also come into the picture over the next year or two. The Gulf Oil Corp.'s Washita County discovery caused considerable leasing in that area. Drilling in this area over the next few years will probably be in the 10,000-ft. and deeper class. That oil companies base their hopes for future reserves here is substantiated by the fact that over 30 seismic crews are in operation west of the ridge.

While the most important discovery of the year was the West Edmond pool of Oklahoma County, which now covers some 840 acres with an indicated reserve at the end of the year of nearly 15,000,000 bbl., the state's main pool continues to be the Pauls Valley. The recent spacing amendment and the large dual completions being brought in have augmented the field's reserves. Development throughout 1943 continued to be on the northwest-southeast trend, with marginal wells completed along the northeast and southwest sides. At the end of the year commercial production had not been extended into Canadian County at the West Edmond field. Sohio Petroleum Co. was still trying to make a well at its 1 Specht in SE NE 36-14n-5w. The well was below 7,000 ft. in the Hunton lime, topped at 6,959 ft. It ran low on the lime in comparison with producers in the field.

As the year ended, Pure Oil Co. had recovered free oil on drill-stem test at its 1 Dillar in NW NE SE 6-3s-

PRODUCTION AND RESERVES—OKLAHOMA

(In thousands of barrels)

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Northeastern District				
Washington County	1,067	367,303	8,513	4,086
Nowata County	3,039		394,61	7,527
Rogers County	750		7,889	3,294
Osage County:				
Burbank	3,251	211,744	42,626	1,691
South Burbank	2,637	36,481	36,519	223
Naval Reserve	835	18,798	5,532	233
Other Osage	4,083	337,491	43,779	5,833
Total Osage	10,806	605,324	128,456	7,890
Total N.E. Oklahoma	15,662	972,627	184,319	227,797
East Central District				
Tulsa County	740	124,130	9,040	2,697
Wagoner County	177	7,394	1,926	398
Okmulgee County	924	109,553	13,157	1,793
Muskogee and McIntosh counties	211	13,295	2,085	454
Eastern Okfuskee Co.	820	58,406	7,224	320
Creek County:				
Bristow-Slick	1,658	140,444	24,486	1,079
Cushing-Shamrock	2,991	365,409	34,211	1,716
Glenn-Sapulpa	1,856	256,947	20,043	1,943
Manford-Olive	352	11,650	3,300	401
East and Southeast Stroud	224	937	1,703	42
Other Creek	872	26,691	7,499	537
Total Creek	7,963	802,078	91,242	5,118
Total E. C. Oklahoma	10,835	1,114,856	124,674	11,380
Seminole District				
Okfuskee County:				
Dill and South and Northeast	336	5,193	5,807	88
East Cromwell	845	3,450	7,550	72
Olympic	419	12,301	2,199	318
Rusk	445	1,118	2,256	9
Miscellaneous	270	2,343	1,657	96
Total	2,315	24,475	19,469	583
Seminole County:				
Allen	1,245	54,020	10,800	293
Bethel district	420	6,270	3,760	362
Bowlegs	1,721	122,536	14,314	203
Carr City	602	30,761	5,939	72
Cromwell district	922	58,780	9,400	235
Dora	246	5,246	954	102
Earlsboro district	3,253	191,512	26,486	382
Grayson	163	2,225	875	32
Keokuk	678	13,270	5,130	90
Konawa district	521	18,110	1,580	156
Little River district	1,931	133,694	9,986	297
Mission	319	28,144	2,556	58
Sasakwa district	344	11,611	2,389	66
Searight district	476	39,045	4,095	66
Seminole district	2,555	154,631	30,179	322
Traugh	121	2,073	827	34
Wewoka district	743	46,321	6,379	138
Miscellaneous	410	8,864	3,736	200
Total	16,670	927,113	129,397	3,108
Pottawatomie County:				
Asher and West	114	11,342	858	37
Avoca	98	1,513	887	17
Brooksville	289	486	1,514	10
Gray	306	4,793	2,537	26
Hotulke and West	384	1,415	3,585	24
Maud and South	220	12,970	1,000	65
McComb	108	135	705	6
Prague	191	1,002	1,498	17
Romulus	186	1,420	1,010	19
Shawnee district	578	3,914	4,836	57
St. Louis district	3,828	164,382	21,118	767
Tecumseh Lake	141	1,088	712	10
Tecumseh East	204	715	1,285	10
Miscellaneous	166	2,460	1,340	78
Total	6,813	207,635	42,885	1,163
Hughes County:				
Adams	253	1,831	2,169	10
Fish	700	18,789	5,111	140
Holdenville	166	5,618	2,142	108
Papoose	164	22,202	1,598	54
Miscellaneous	166	5,427	1,423	68
Total	1,449	53,867	12,443	380
McClain County:				
Byars	143	595	1,105	12
Pontotoc County:				
Bebee district	1,057	14,522	9,628	242
Fitts	2,489	99,895	10,855	696
Jesse	613	6,230	5,770	56
Miscellaneous	225	3,038	1,742	520
Total	4,384	123,685	27,995	1,514
Coal County	28	199	161	7
Total Seminole	31,802	1,337,569	233,455	6,767

(Continued on Next Page)

?e after landing packer in the Oil Creek sand at 8,960 ft. It was drilled to 10,000 ft. Prospects of a good discovery, however, were unfavorable.

OKLAHOMA

Completions by Fields in 1943

Field—	Comp.	Oil	Prod.	Gas	Dry
Apache	2	2	341	0	0
Big Bend	3	3	2,261	0	0
Brooksville	4	2	560	0	2
Byars	8	6	978	0	2
Cement	22	16	6,129	3	3
Crescent	6	6	1,109	0	0
Cromwell	2	2	665	0	0
Cumberland	29	26	19,173	0	3
Dill, Northeast	11	9	1,462	0	2
Dilworth	2	2	383	0	0
Doyle	3	3	877	0	0
Earlsboro, North	6	5	1,053	0	1
Edmond, Northeast	10	9	307	0	1
Edmond, West	11	11	8,995	0	0
Elgin	25	8	270	4	13
Garber	6	6	146	0	0
Guthrie townsite	3	1	120	0	2
Hewitt	1	1	214	0	0
Horns Corner	5	4	1,851	0	1
Hotulke-West Earlsboro	1	1	118	0	0
Lake Shawnee	5	0	0	0	5
Liberty	3	0	0	0	3
Loco	49	38	2,369	0	11
McComb	5	2	467	0	3
McCloud, North	3	2	357	0	1
Oklahoma City	7	6	1,163	0	1
Okemah, North	1	1	240	0	0
Pauls Valley	43	40	31,460	2	1
Roper	3	3	137	0	0
Rusk	2	2	656	0	0
Same, East	1	1	52	0	0
St. Louis district	6	2	90	0	4
Seminole	10	7	606	1	2
Shawnee, Northeast	3	2	742	0	3
Stroud, East	10	7	558	0	3
Sylvan	5	2	133	0	3
Velma	30	19	1,063	2	18
Watchorn, East	11	7	1,739	1	3
Wewoka townsite	13	10	2,599	0	3
Creek County	117	76	2,971	8	33
Okfuskee Co.	23	9	593	8	6
Okmulgee Co.	29	7	152	10	12
Osage County	61	35	730	6	20
Pawnee County	9	6	73	0	3
Seminole Co.	22	5	193	0	17
Tulsa County	9	3	49	0	6
Wildcats	310	40	9,362	23	247
Miscellaneous	225	88	3,807	24	113
Total	1,184	543	109,373	92	549
Total 1942	1,159	535	109,946	83	541

Oklahoma Wildcat Completions

County—	Comp.	Oil	Prod.	Gas	Dry
Atoka	1	0	0	0	1
Beckham	4	0	0	0	4
Bryan	3	0	0	0	3
Caddo	1	0	0	0	1
Carter	2	0	0	0	2
Cleveland	5	2	344	0	3
Coal	3	0	0	0	3
Comanche	15	1	10	3	11
Cotton	4	1	8	0	3
Creek	8	4	381	0	4
Garfield	3	0	0	0	3
Garvin	10	0	0	0	10
Grady	1	0	0	0	1
Grant	1	0	0	0	1
Greer	4	0	0	1	3
Haskell	3	0	0	0	3
Hughes	11	3	537	5	3
Jackson	3	0	0	3	0
Jefferson	5	0	0	0	5
Johnston	1	0	0	0	1
Kay	9	0	0	0	9
Kiowa	4	0	0	0	4
Lincoln	28	1	205	0	27
Logan	11	1	75	0	10
Love	2	1	5	0	1
Marshall	4	0	0	0	4
McClain	2	1	200	0	1
McIntosh	4	0	0	1	3
Muskogee	2	0	0	0	2
Noble	13	4	609	0	9
Okfuskee	21	1	2,445	3	17
Oklahoma	8	3	641	0	5
Okmulgee	3	0	0	0	3
Osage	10	1	309	0	9
Pawnee	20	1	2	1	18
Payne	18	4	706	3	11
Pittsburg	3	0	0	1	2
Pontotoc	3	0	0	0	3
Pottawatomie	21	8	2,403	0	13
Roger Mills	1	0	0	0	1
Seminole	15	2	69	0	13
Sequoyah	1	0	0	1	0
Stephens	15	1	113	1	13
Tillman	2	0	0	0	2
Washita	1	0	0	0	1
Woodward	1	0	0	0	1
Total	310	40	9,362	23	247
Total 1942	315	50	15,745	12	253

Completions by Months

Month—	Comp.	Oil	Gas	Dry	Footage
January	89	31	4	54	273,607
February	81	34	10	37	242,227
March	113	51	14	48	382,470
April	84	41	4	39	282,821
May	65	28	5	32	223,486
June	103	57	8	38	407,573
July	90	43	2	45	304,154
August	119	49	5	65	373,997
September	147	58	12	77	463,174
October	62	31	7	24	216,646
November	116	67	9	40	413,214
December	115	53	12	50	361,474
Total	1,184	543	92	549	3,944,843

PRODUCTION AND RESERVES—OKLAHOMA (Continued)

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Central District				
Payne, Pawnee and Lincoln counties:				
Chandler-Hoyt	201	12,792	1,728	46
Coyle district	1,627	5,802	10,898	37
Cleveland-Keystone	338	43,270	3,000	501
Davenport	197	12,478	2,492	124
Laffoon	186	2,252	1,626	12
Lauderdale	181	13,783	2,367	183
Ramsey	1,590	8,200	14,800	41
Sac and Fox	181	3,516	2,259	140
Watchorn and East	1,085	9,061	8,969	37
Wilzetta and South	171	1,655	1,845	17
Yale district	837	42,100	8,120	382
Miscellaneous	1,051	49,207	9,398	254
Total	7,645	204,116	67,724	1,774
Oklahoma and Cleveland counties:				
Britton and South	118	2,779	1,021	22
Edmond and Northeast	1,161	20,335	10,415	98
Moore	201	8,855	1,745	20
Oklahoma City	20,338	593,736	114,584	843
West Edmond	322	322	14,178	14
Miscellaneous	91	819	1,681	26
Total	22,291	636,846	143,624	1,023
Total Central Okla.	29,936	830,962	211,348	2,797
West Central District				
Caddo and Kiowa counties:				
Apache	2,309	4,323	57,677	28
Cement	2,564	28,652	25,948	365
Hobart	71	1,504	896	23
Total W. C. Okla.	4,944	34,479	84,521	416
North Central District				
Garfield, Grant, Kay and Logan counties:				
Blackwell district	133	6,562	1,538	40
Billings	1,706	21,234	16,866	87
Braman district	347	22,639	2,061	72
Crescent	732	14,963	6,377	49
Dilworth	252	5,802	2,198	77
Garber	601	56,351	7,149	526
Guthrie	720	2,685	5,715	33
Hubbard	134	8,655	1,345	33
Langston and South	138	1,867	1,333	14
Lovell and South	171	3,391	1,609	16
Lucien district	1,575	32,871	13,329	136
Navina and South	93	241	959	9
Otoe	136	356	1,344	5
Polo	184	4,501	1,599	25
Tonkawa	512	122,478	6,122	149
Vernon	148	3,611	1,389	25
Miscellaneous	491	45,815	4,085	135
Total N. C. Okla.	7,993	354,022	75,006	1,434
South Central District				
Bryan, Marshall and Love counties:				
Cumberland	3,735	9,447	50,553	84
Miscellaneous	98	1,627	813	183
Total S. C. Okla.	3,833	11,174	51,366	267
Southwestern District				
Carter, Comanche, Cotton, Garvin, Grady and Stephens counties:				
Duncan district	1,003	27,847	9,023	562
Graham-Fox	656	42,792	5,958	391
Healdton	2,618	195,757	29,365	1,874
Hewitt	2,382	98,487	10,213	906
Knox	496	16,149	3,501	179
Loco-Milroy	428	6,024	4,206	240
Pauls Valley	1,963	2,786	30,814	49
Robberson	287	15,626	3,374	166
Sholem-Alechem	798	39,526	7,474	304
Tatums-Tussy	1,477	23,544	11,856	319
Velma	602	7,148	3,322	662
Wildcat Jim	506	17,919	4,581	86
Walters	259	25,972	2,278	221
Miscellaneous	767	17,906	7,092	544
Total	14,242	537,485	135,057	6,503
Jackson, Jefferson and Tillman counties:				
Altus	171	1,880	1,120	114
Tipton	132	1,972	928	57
Oscar-Seay	397	2,338	3,462	231
Spring	147	3,369	1,611	38
Frederick and West	364	3,075	1,525	32
Red River	101	1,611	789	80
Total	1,312	14,245	9,435	552
Total S. W. Okla.	15,554	551,730	144,492	7,055
Total Oklahoma	120,550	5,207,419	1,109,181	52,913

PROBLEM SOLUTIONS

IN HIGH-TEMPERATURE HIGH-PRESSURE DESIGN

This vessel is a typical example of the cooperative effort of Babcock & Wilcox and customers' engineers in designing and producing process equipment. Designed for operating temperatures of 750 F.-1200 F., with wide fluctuations, at 135 psi, and with the large number of tubes in the one sheet, the vessels presented a very difficult design and stress-distribution problem.

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ALLOY CASTINGS

No service failures have been reported, in more than two million pounds of B&W oil still tube support castings operating at temperatures as high as 2000 F. Other castings produced, some of which are shown below are: soot blower elements, heat-treating furnace parts, lead-melting wire annealing pots, cement mill castings, paper mill and chemical plant castings, boiler castings, baffles, impellers, oil burner nozzles and rolling mill plugs.

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NORTH CENTRAL TEXAS

Strong Market Position Aids Deeper Development

WICHITA FALLS, Tex. — A strong market position brought on by the war demand generally and the shortage of sweet high-gravity oil in the Mid-Continent area particularly stimulated both interest and activity in the North Central Texas district during 1943. This was manifested by a steady and continuing increase in the number of completions registered each month with 52 recorded in February and 141 in December, the highest number of completions reported since January 1942 when there were 174 wells finalled. At the close of the year all of the rigs in the area were engaged. There were sufficient discoveries and good prospects to indicate a continuance of the present rate of development through 1944.

Over one-fourth of the tests drilled in the district were wildcats, there being 330 in this classification, and 57 of them discovered oil. Eleven of the discoveries were either deeper or shallower sands in known fields.

Deeper prospecting throughout the area was much in evidence during the year, and this is reflected by the discoveries which show that 25 out of the 40 principal discoveries were deeper than the Strawn (Pennsylvanian) sand. The Caddo lime (Pennsylvanian) was the leader with 10 discoveries, the Strawn was second with 9, the Mississippian was third with 7, and the Ellenburger fourth with 3 discoveries. There were two discoveries in the Marble Falls (Pennsylvanian) and the Bend (Pennsylvanian). Geologically, the Marble Falls and the Caddo are formations in the Bend which would bring the total credited to that group to 15 discoveries for the year.

Some of the discoveries in the basal Pennsylvanian resulted from wildcats which were drilled to the Ellenburger. This was the case at Hildreth, in Montague County, which was a 1942 Ordovician discovery. Testing of the Bend at 5,992 to 6,107 ft. in the second well drilled in the field discovered conglomerate production. Continental Oil Co. 1-A Jack Hildreth, the conglomerate discovery completed in February for 4,504 bbl. a day, was followed up with 13 wells in that pay, having total initial of 25,649 bbl. daily.

The largest single reserve in the district discovered during the year was at Walnut Bend, in Cooke County, a pool already producing from Ellenburger, Simpson, upper Strawn and lower Strawn. The Winger sand, a member of the Strawn series, was found at 5,495 to 5,535 ft. and the discovery well flowed 880 bbl. per day. Subsequent drilling added 25 oil wells out of 27 tests with a total initial of 21,633 bbl. per day.

The Joy pool in Clay County experienced considerable development in both the Mississippian and Strawn pays. There were eight tests in the Mississippian, five of which were successful for a total initial of 18,511 bbl. Strawn development had a higher percentage of successes with seven oil wells out of eighth tests completed.

Considerable interest was also attracted to the Mississippian in southern Clay County by discovery of the Stephens pool. Continental 1 Stephens, G. W. Tipps Survey, discovery well, flowed 483 bbl. of oil and 36

PRODUCTION AND RESERVES—NORTH TEXAS

(In thousands of barrels)

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Archer County:				
Hull-Silk	3,937	14,613	45,387	439
Kadane	232	547	2,713	23
Mankins	182	670	2,030	14
Scotland	369	652	3,848	29
Vogtsberger	86	151	849	10
Miscellaneous	2,740	129,563	29,587	3,291
Total	7,546	146,196	84,414	3,806
Baylor County:				
Rendham	75	213	787	13
Seymour	391	1,099	4,901	35
Miscellaneous	126	5,323	1,177	126
Total	592	6,635	6,865	174
Clay County:				
Antelope	599	1,314	6,686	56
Halsell	174	481	3,269	11
Joy	363	377	2,623	12
New York City	133	274	1,826	10
Ross	118	314	2,986	20
Watson	74	108	802	11
Miscellaneous	1,277	13,259	14,291	954
Total	2,636	16,127	32,573	1,074
Cooke County:				
Voth	120	509	1,091	55
Walnut Bend	1,900	5,633	19,067	157
Miscellaneous	1,299	23,171	14,389	1,006
Total	3,413	29,313	34,547	1,208
Foard County	68	2,094	606	15
Jack County:				
East Bryson	790	3,330	7,670	150
Ellis	317	217	2,423	17
Hoefle	93	225	2,775	10
Miscellaneous	1,667	19,463	16,977	573
Total	2,767	23,235	29,845	750

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Montague County:				
Bonita	285	873	3,127	17
Bowers	352	1,049	3,951	28
Dodson	105	105	1,895	6
Forrestburg	118	211	1,069	12
Hildreth	167	171	1,829	11
Ringgold	268	667	3,093	15
Rogers and Rogers	376	1,950	4,050	38
Sanders	87	164	1,036	4
Miscellaneous	1,408	35,041	15,731	971
Total	3,146	40,231	35,781	1,110
Wichita County:				
Burkburnett	1,406	137,817	12,183	In misc.
Electra	2,001	145,679	14,321	In misc.
K.M.A.	10,860	51,712	228,288	1,752
Miscellaneous	314	49,597	3,653	5,380
Total	14,671	384,805	258,445	7,131
Wilbarger County:				
Consolidated	237	1,241	1,759	37
Fargo	1,272	2,360	14,080	50
Harrold	100	194	1,106	16
Rock Crossing	275	532	3,186	38
Miscellaneous	2,064	79,226	21,484	1,542
Total	3,958	83,553	41,617	1,683
Young County:				
Burns-Ragland	107	127	1,073	5
James	142	317	1,683	44
Knox	310	730	4,270	50
Lupton-McLester	104	261	1,639	37
Murray	87	88	912	4
Padgitt	97	123	1,077	5
Sewell	222	1,617	1,983	39
Miscellaneous	2,470	76,372	26,558	2,238
Total North Texas	41,273	808,361	551,251	19,190

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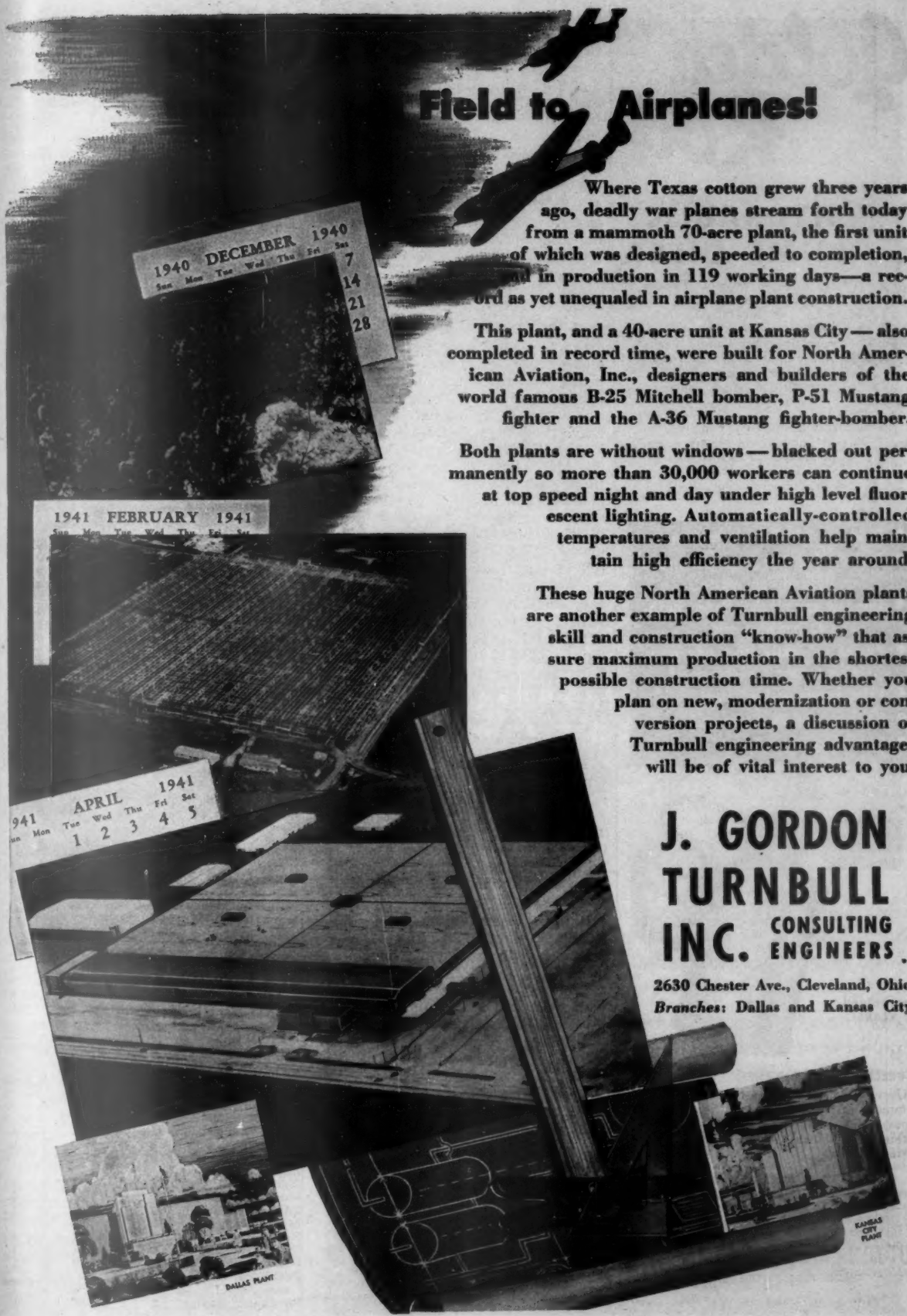

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Though we are tremendously busy on war contracts, a limited number of Oilers are available and we suggest you order through your Supply Jobber, now.

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MANUFACTURERS SINCE 1886

per cent water from Mississippi lime at 6,011 ft. Discovery well of Burns-Midway pool, L. T. Burns 1 J. P. Thompson, Webb subdivision of the San Augustine County School Land Survey, flowed 1,197 bbl. per day from Mississippi lime at 5,972 ft. The Bellevue pool discovery, Shell Oil Co., Inc. 1 R. F. Wynn, Rooney Survey, flowed 1,980 bbl. of oil and 48 bbl. of water from Mississippi lime at 6,253 ft. Stephens is 5 miles northeast of Joy, Burns-Midway is 4½ miles northeast of Joy, and Bellevue is 3 miles east of Burns-Midway.

Young County wildcat work was concentrated mainly on wells drilled to the Mississippian or Ellenburger, with the Bend section being tested en route. There were three Mississippian discoveries, Bunger-Mississippian in the McLaurin Survey, an unnamed pool in the E. W. Sargent Survey, and a new pay in the Murray pool in the Edwards Survey. Bend discoveries in Young County included Donnell in the Mary Edmunds Survey, Murray (new pay) T.E.&L. Survey, Bunger-Marble Falls in the F. M. Diew Survey, an unnamed pool in the I. W. Walsh Survey, and two unnamed ones in the T.E.&L. Survey. Highest initial of the above discoveries was in the unnamed pool in the Walsh Survey, Anderson-Prichard 1 Myers and Walsh, which flowed 2,224 bbl. of 42.5° A.P.I. gravity oil from Caddo lime at 4,242-83 ft. The Bunger-Marble Falls discovery flowed 1,128 bbl. per day of 41 gravity oil from pay at 3,990 to 4,007 ft.

Consolidated Pool Extended

The Consolidated pool in Wilbarger County received an important extension in the W. T. Waggonner estate 1-MM fee, Section 8, Block 17, H.& T.C. Survey, which was completed in the Ellenburger at 4,429-34 ft. for an initial of 792 bbl. There were two additional wells drilled later in the immediate vicinity.

Illinois Bend (Montague), West (Wichita), and McDonald (Jack) were the better Strawn sand pools found during the year. The discoveries in each of the pools flowed. West added four wells and McDonald added two wells out of as many attempts while at Illinois Bend there were three successful wells out of six tests drilled.

Two of the three Ellenburger discoveries came late in the year and there has been insufficient development to indicate their importance. The first Ellenburger discovery, Consolidated Oil Co. 1 Alex Davidson, J. R. McDowell Survey, Wichita County, 3 miles south of Wichita Falls, had initial flowing production of 1,224 bbl. per day from pay at 4,429-34 ft. A dry hole dampened interest in the pool.

The Taylor pool in Archer County was opened by McCarthy & Coleman 1-A Taylor, Section 13, Block 17, A.T.N.C.L. Survey, which flowed 875 bbl. through ⅝-in. choke from Ellenburger pay at 4,940-70 ft. Cooke County's Dangelmayer pool was discovered by Phillips Petroleum Co. and Perkins & Bourland 1 J. Dangelmayer, E. Langford Survey, 7 miles southwest of Muenster, which flowed 818 bbl. from the Ellenburger at 2,178-83 ft. The Taylor discovery was completed October 20 and the Dangelmayer November 10.

NORTH TEXAS

Summary of wells completed during 1943

Field—	Comp.	Oil	Prod.	Gas	Dry
Wildcats	330	57	16,868	0	273
Airport, Wichita	2	1	30	0	1
Allar, Young	8	6	1,390	0	2
Antelope, Clay	2	2	498	0	0
Anzac-Graham	2	0	0	0	2
Bindel Ellenburger, Cooke	3	1	970	0	2
Bowers, Montague	5	1	350	0	4
Briar Creek, Young	5	3	233	0	2
Browning, Archer	3	3	941	0	0
Bryson, Jack	1	0	0	1	0
Bunger, Young	1	1	17	0	0
Burkburnett, shallow, Wichita	14	6	281	0	8
Burns Browning, Clay	2	0	0	0	2
Burns Midway, Clay	2	1	2,080	0	1
Burns Ragland, Young	2	1	3,364	0	1
Buttram, Jack	1	1	19	0	0
Consolidated Wilbarger	6	6	1,732	0	0
Cooper, Archer	8	5	1,461	0	3
Davidson, Wichita	2	1	690	0	1
Daws, Young	1	0	0	0	1
Deep Rock, Young	1	0	0	0	1
Dodson, Montague	3	3	3,723	0	0
East Bryson, Jack	6	4	334	0	2
Electra, Wichita	33	18	1,707	0	15
Ellis, Jack	10	9	3,535	0	1
Fargo, Wilbarger	7	5	435	0	2
Fleitman, Cooke	3	3	112	0	0
Forestburg, Montague	1	0	0	0	1
Garvey, Young	1	1	447	0	0
Halsell, Clay	2	2	58	0	0
Harrold, Wilbarger	5	4	662	0	1
Hildreth, Montague	13	13	25,649	0	0
Hoefle, Jack	11	8	2,056	0	3
Holbert, Young	1	0	0	0	1
Hull-Silk, Archer	3	3	913	0	0
Owens & Hults, Montague	1	0	0	0	1
Illinois Bend, Montague	6	3	895	0	3
Joy, Clay	8	7	2,393	0	1
Joy Mississippi, Clay	8	5	18,511	0	3
KMA Ellenburger, Wichita	11	8	4,917	0	3
KMA, Wichita	17	16	4,559	0	1
Knox, Young	1	0	0	0	1
Knox Mississippi, Young	3	2	2,854	0	1
Little Wichita, Archer	4	3	2,746	0	1
Lupton & McLester, Young	11	10	618	0	1
McDonald, Jack	2	2	635	0	0
McGeorge, Cooke	1	1	35	0	0
Mueller, Montague	5	3	2,657	0	2
Muenster, Cooke	7	4	58	0	3
Murray, Young	4	3	2,025	0	1
Myers, Jack	2	1	86	0	1
North Knox	1	1	706	0	0
Padgitt, Young	3	2	1,834	0	1
Peek, Jack	1	0	0	0	1
Pottsboro, Grayson	1	0	0	0	1
Rendham, Baylor	2	1	51	0	1

Field—	Comp.	Oil	Prod.	Gas	Dry
Ringgold, Montague	1	1	25	0	0
Rock Crossing, Wilbarger	9	6	1,385	0	3
Rogers & Rogers, Montague	3	2	2,092	0	1
Ross, Clay	3	3	208	0	0
Scotland, Archer	10	8	2,585	0	2
Sewell, Young	5	2	30	0	3
Seymour, Baylor	7	6	1,162	0	1
Stephens, Clay	2	1	262	0	1
Stoneburg, Montague	3	3	814	0	0
Taubert & McKee	2	0	0	0	2
Turner, Montague	1	0	0	0	1
Vogstberger, Archer	14	12	3,235	0	2
Walnut Bend, Cooke	27	25	21,633	0	2
Watson, Clay	9	6	645	0	3
Weir, Jack	2	1	71	0	1
West, Wichita	4	4	562	0	0
Wilson, Cooke	1	1	12	0	0
Williamson, Young	2	1	95	0	1
Worsham Steed, Jack	1	0	0	0	1
Archer County*	104	39	990	0	65
Baylor County*	2	0	0	0	2
Clay County*	173	95	3,155	0	78
Cooke County*	12	7	128	0	5
Jack County*	21	14	227	0	7
Montague County*	9	7	333	0	2
Wichita County*	77	24	1,743	0	53
Wilbarger County*	10	6	2,101	0	4
Young County*	59	31	1,780	0	28
Total	1,172	547	161,358	2	623

* Miscellaneous.

NORTH TEXAS

Completions by months

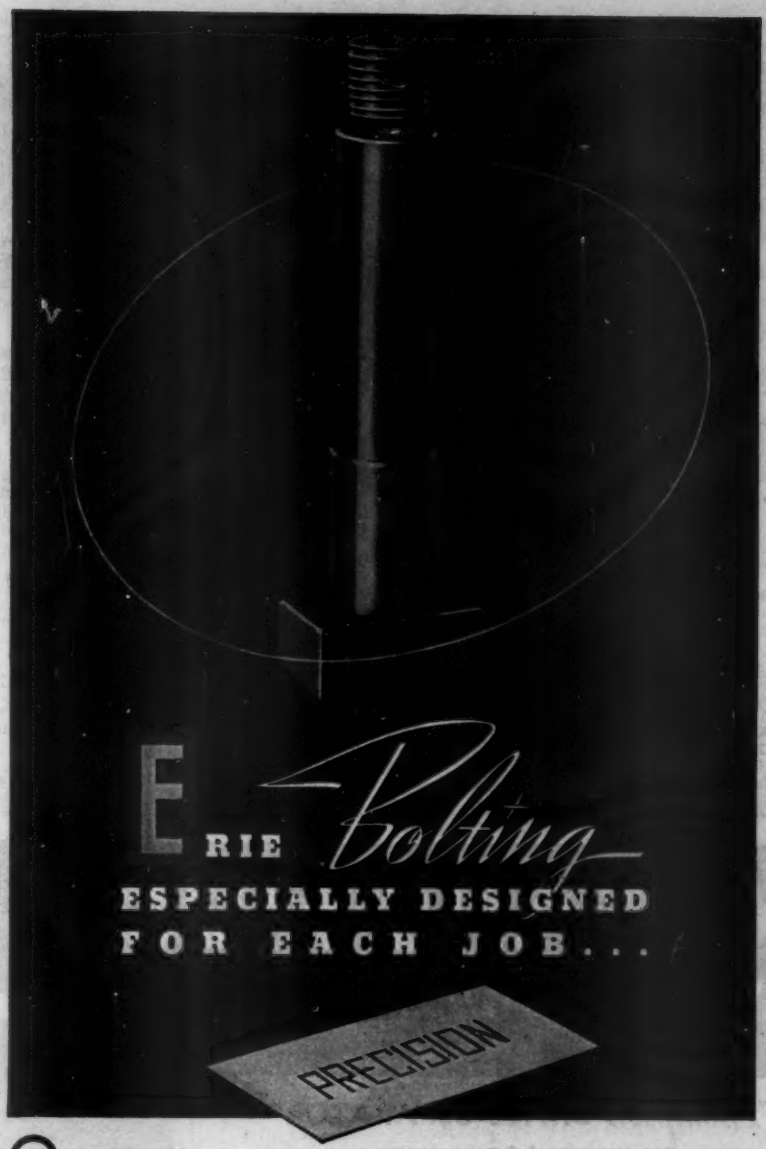
Month	Comp.	Oil	Gas	Dry	Footage
January	67	30	0	37	220,566
February	52	23	0	29	133,784
March	68	34	0	34	204,855
April	82	34	0	48	211,204
May	91	35	0	56	287,747
June	71	23	1	47	196,454
July	115	49	0	66	312,279
August	129	55	0	74	311,139
September	118	70	0	48	289,299
October	123	66	0	57	359,703
November	115	61	1	53	313,194
December	141	67	0	74	396,371
Total, 1943	1,172	547	2	623	3,236,660

Exploration Unfruitful in West Central Texas Area

ABILENE, Tex. — Exploration in West Central Texas was disappointing during 1943. Out of 150 tests drilled only 9 new oil fields were discovered and 3 new pays developed in existing fields. Interest in the district was sustained by the development of multizone production in the Wimberly pool of Jones County.

Mississippian production found in Stephens County by the Texas Pacific Coal & Oil Co. gave the district a new pay. Two of the discoveries were in the Mississippian, each of them underlying an old pool and discovered by drilling deeper wells. In a modest way this added weight to assertions that the place to look for oil was under existing fields.

The first Mississippian discovery in the district was the Texas Pacific 12 S. H. Hill, Section 1122, TE&L Survey in the old Eliasville pool, northern Stephens County, which found the



OUR business has always been the making of bolts, studs and nuts to specifications with emphasis on the specials. Our customers are legion; 25 pieces here, a hundred there, and thousands for that special refinery-synthetic plant.

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SPEED THE DAY OF VICTORY—BUY BONDS

pay at 4,230 ft. and flowed 4,234 bbl. of 44-gravity oil. Later in the year the same company moved 2 miles southwest and drilled 1-C Brown, Section 114, TE&L Survey, which flowed 1,320 bbl. from Mississippi lime pay at 4,162-72 ft. These fields are an extension of the Young County area in North Central Texas which is currently undergoing considerable Mississippian development.

The South Noodle pool in Jones received a new pay in the Noodle Creek lime when Cardinal Oil Co. 1 Frank Carter, Section 33, Block 18, T&P Survey, was completed in that zone at 2,444-48 ft., for an initial of 288 bbl. Ten oil wells were completed in the new pay by the end of the year to add 200 productive acres to the reservoir.

The biggest single addition to the reserves and to the productive capacity of the district was development of multizone production in the Wimberly field where there are four producing zones and where a pro-

PRODUCTION AND RESERVES—WEST CENTRAL TEXAS

(In thousands of barrels)

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Brown County	426	31,736	3,634	817
Callahan County	346	15,478	2,002	1,129
Coleman County:				
Coker	109	165	1,035	13
Novice and North	186	1,092	1,568	49
Silver Valley	86	205	905	13
Miscellaneous	328	11,443	2,957	328
Total	709	12,901	6,585	403
Comanche County	90	1,892	808	110
Eastland County	746	100,236	7,904	413
Erath County	23	736	214	12
Fisher County:				
Rotan	94	1,489	771	29
Roxston	336	12,060	2,490	97
Miscellaneous	58	331	759	8
Total	488	13,880	4,020	134
Haskell County	16	225	158	12
Jones County:				
Akard	126	389	2,011	29
Avoca, North and West	570	2,901	5,349	59
Griffin	510	2,647	4,973	65
Hawley	96	4,190	1,060	65
Lewis Steffens	190	2,682	1,548	175
Noodle	113	295	1,205	17
Sayles	266	2,642	3,078	79
Wimberly	421	631	6,369	86
Miscellaneous	385	9,377	4,173	175
Total	2,227	25,754	29,766	749
Palo Pinto County	88	5,172	836	130
Shackelford County:				
Ivy	365	2,242	4,238	71
Nail district	105	673	957	25
Miscellaneous	1,322	44,040	15,960	1,898
Total	1,792	46,955	21,155	1,996
Stephens County	1,064	129,173	12,167	614
Stonewall County	36	200	380	8
Taylor County:				
Reddin district	104	118	1,892	7
Miscellaneous	161	934	946	47
Total	265	1,052	2,838	54
Throckmorton County	198	4,057	1,443	249
Runnels County	39	1,110	290	11
Total W. C. Texas	8,453	390,557	94,212	6,839

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Stationary Type D+B Rod Liner Pump, with exclusive D+B design bottom lock hold-down. Built for severe pumping duty in sandy or gassy conditions or in crooked or slant holes. Equipped with chromium plated plunger; hardened cast iron liners; double valves; armored unitized closed cages; armored valve rod guide; Superloy balls and seats.

Traveling Type D+B Rod Liner Pump with 3-cup bottom hold-down. Recommended for wells of medium depth where severe pumping duty demands a pump of the highest quality. They are equipped with all the standard pump parts that characterize the entire line.

Stationary Type D+B Rod Liner Pump, with 3-cup top hold-down. Exceptionally efficient and recommended for heavy pumping duty. Pump shown is standard type with extension spacers; valve at both top and bottom of plunger; armored cages; Superloy balls and seats; chromium plated plunger; hardened cast iron liners and double standing valves. Many parts on this type pump are interchangeable with D+B Full Seal "B" and Challenger "B" Pumps.

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gram of dual completion of existing wells and of drilling new ones to be similarly completed and equipped was under way.

Three Reef Lime Pays

Productive zones are the Flippen lime at approximately 2,100 ft., the upper Hope lime at approximately 2,240 ft., lower Hope or Brookover at 2,300 to 2,340 ft., and the Gunsight at 2,360 to 2,550 ft. All are reef limes which have a fairly high productivity index. The two deeper zones are exploited most extensively in the dual-completion campaign. Initial production ranges from 1,500 to 3,000 bbl. per day from both zones. The 1943 drilling campaign added 1,400 acres to Wimberly's proven limits. It is the best field registered in the district in recent years.

In November the Hardy pool in Jones County was opened at Great Lakes Carbon Co. 1 Hardy, Section 11, Block 4, H&TC Survey, 7 miles north of Anson. This well found the Canyon sand pay, uncommon to this district, at 3,692 to 3,710 ft., and was completed for a daily potential of 154 bbl. Two additional tests in the area are now under way.

WEST CENTRAL TEXAS

Summary of Wells Completed During 1943

Field, county—	Comp.	Oil	Prod.	Gas	Dry
Wildcats	150	12	6,377	2	136
Akard, Jones	2	1	31	0	1
Amity, Comanche	3	3	27	0	0
Avoca, Jones	4	1	57	0	3
Avoca, North, Jones	2	0	0	0	2
Boyd, Stonewall	1	1	51	0	0
Carlisle, Stonewall	1	0	0	0	1
Coker, Coleman	4	4	468	0	0
Cook, Shackelford	11	4	304	0	7
Grogan, Jones	1	0	0	0	1
Hilburn, Eastland	2	1	96	0	1
Howard, Fisher	1	1	90	0	0
Lawson, Haskell	1	1	250	0	0
Loving, Stephens	2	2	206	0	0
Anzac Morris, Coleman	2	1	2	0	1
Merkel, Taylor	7	4	603	0	3
Nail, Shackelford	5	5	327	0	0
Noodle Creek, Jones	1	0	0	0	1
Prichard, Callahan	2	0	0	0	2
Reddin, Taylor	4	3	2,920	0	1
Roark Nail, Shackelford	4	1	25	0	3
Santa Anna, Coleman	2	0	0	2	0
Sayles, Jones	2	2	190	0	0
Scranton, Callahan	2	0	0	0	2
Silver Valley, Coleman	1	0	0	0	1
Smith-Morgan, Comanche	5	4	41	0	1
South Noodle, Jones	12	10	2,421	0	2
Stith, Jones	6	4	1,503	0	2
Strand, Jones	7	4	2,643	0	3
View, Taylor	2	1	125	0	1
Wimberly, Jones	39	33	39,694	0	6
Brown County*	6	0	0	2	4
Callahan County*	5	1	9	0	4
Coleman County*	6	3	159	0	3
Comanche County*	4	2	7	0	2
Eastland County*	6	0	0	1	5
Jones County*	3	1	200	0	2
Palo Pinto*	7	0	0	3	4
Shackelford Co.*	31	18	785	0	13
Stephens County*	10	4	5,400	1	5
Throckmorton Co.*	13	5	106	0	8
Total	379	137	65,169	11	231

*Miscellaneous.

Completions by Months

Month—	Comp.	Oil	Gas	Dry	Footage
January	25	7	2	16	70,630
February	25	8	3	14	55,112
March	30	6	2	22	66,854
April	25	5	1	19	57,726
May	35	12	1	22	80,903
June	21	9	0	12	58,322
July	42	9	0	33	89,631
August	25	8	1	16	66,469
September	37	17	1	19	70,606
October	48	27	0	21	97,842
November	41	17	0	24	93,900
December	25	12	0	13	51,848
Total	379	137	11	231	859,853

Michigan Fields

(Continued from page 194)

tinue its gradual decline.

Development in the Headquarters field, Michigan's second ranking reserve, consisted of five new wells last year, indicating that new drilling offers little prospect of halting the normal decline in production.

Deep exploration in Michigan was only relatively active during the past year. Gulf Oil Corp., however, has started another deep test for exploration of the Salina in the Kawkawlin field, Bay County. The new test is in the same general area as that in which Gulf drilled Michigan's deepest test to 10,447 ft. in 1942, penetrating dry St. Peter sand. The deep well was eventually completed in the Salina for 7,000,000 cu. ft. of gas accompanied by 30 to 50 bbl. of condensate daily. Since preliminary testing operations were completed, the Salina discovery well has remained shut in.

The deepest wildcat well drilled in 1943 was W. H. Colvin, Jr. 1 Glasser, 14-3n-1e, Ingham County, which penetrated dry St. Peter sand in drilling to 6,599 ft. The well was ordered plugged.

Three new potential pool discoveries were at various stages of testing when the new year opened and furnish the state's industry with incentives to support the expanding exploratory campaign. One wildcat, a mile south of the nearest production in the Wise field in Isabella County, was testing Dundee pay and showing for a discovery.

One of the best prospects among the potential field discoveries at the start of this year was in Deep River Township, Arenac County, where Basin Oil Co. and Don Rayburn 1 Weblo, 8-19n-4e, flowed natural at the rate of 200 to 250 bbl. daily from Dundee pay at 2,839-40 ft. The prospective Dundee discovery is ½ mile north of a Berea sand gas well in the Deep River Berea gas field. It is 3 miles northeast of the North Adams field and 6 miles south of the old Clayton field. The general area has attracted considerable exploratory drilling in the past few years, affording the subsurface control leading to what now appears to be a discovery producer.

Wildcatters Find 75 Oil Wells in 15 Counties in Search for New Pools

CENTRALIA, Ill.—Fifty-three Illinois counties were explored by wildcatters in 1943, and discoveries were made in 17 of them, but the majority of the 75 wildcat oil wells proved to be extensions of pools already established. More than a score of new pools were opened during the year in Jefferson, Wayne, Edwards, White, Christian, Jasper, Clay, Richland, Effingham and Fayette counties.

The busiest pools during the year were Iola in Clay County, Mount Carmel in Wabash County and Clay City in Clay County. Seventy-one oil wells were completed in the Iola pool, 72 in Mount Carmel and 45 in the Clay City field. Phillipstown, in White County, added 42 oil wells to its list and Dale-Hoodville in Hamilton County added 40 producers.

Further attempts to discover oil in the St. Peter sand proved unavailing and no important discoveries were made in the search for Devonian lime production, but wells drilled in Madison County to Trenton rock at shallow depth proved profitable.

There was no great rush to develop the fields discovered during the year, owing mainly to the various restrictions on drilling operations, but a few of the discoveries were followed up vigorously. The West Lancaster pool opened in Section 11-1n-14w in July had 25 oil wells and 5 dry holes

PRODUCTION AND RESERVES—ILLINOIS

(In thousands of barrels)

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Centralia-Salem area:				
Bartelso and South	157	1,351	1,006	63
Boulder	564	938	3,342	20
Centralia	1,683	42,044	5,156	528
Cordes	383	2,517	3,033	130
Dix	535	3,540	3,010	79
Fairman	215	956	1,594	23
Irvington	551	2,851	1,955	85
King	263	294	1,206	24
Markham City	487	667	2,333	23
Patoka and East	774	5,054	5,006	153
Salem	10,220	177,218	36,982	2,243
Sandoval	145	5,016	544	48
Tonti	697	6,275	1,878	66
Woodlawn	1,446	6,977	4,563	141
Miscellaneous	280	5,763	2,497	80
Total	18,400	243,461	74,105	3,716
Louden area:				
Iola	1,003	1,016	4,284	70
Louden	13,702	101,382	94,018	1,924
Mason and South	269	595	1,955	47
St. James	1,130	6,791	3,809	176
St. Paul	91	174	306	13
Miscellaneous	71	657	393	32
Total	16,266	111,615	104,765	2,262
Dale-Hoodville area:				
Akin	95	131	469	7
Benton and North	2,534	15,045	8,625	170
Blairsville	614	669	2,331	24
Dale-Hoodville	3,909	16,153	11,677	392
Rural Hill	1,715	4,420	5,232	195
Walpole	894	1,705	2,715	56
West Frankfort	180	180	820	17
Miscellaneous	103	369	431	19
Total	10,044	41,620	32,300	880
Clay City area:				
Aden and North	458	3,737	1,773	82
Albion	405	2,744	1,486	83
Barnhill and East	321	1,902	3,238	63
Bible Grove and South	763	1,049	4,261	60
Bone Gap	178	472	1,202	15
Boyleston	425	3,446	2,594	98
Centerville and East	492	1,134	2,596	46
Cisne and North	159	2,800	1,300	43
Clay City Consol. & W.	2,764	31,238	13,092	703
Coil	372	627	1,203	19
Covington	1,048	2,207	7,033	49
Dundas	1,295	10,849	7,051	290
Flora and East	108	566	544	18
Geff	314	430	1,740	21
Johnsonville	2,170	12,847	10,273	252
Maple Grove	234	234	2,266	14
Mill Shoals	371	2,923	1,817	100
Mount Erie	229	337	873	27
Noble	2,518	17,173	13,127	271
North Boos	598	2,121	2,479	71
Olney	148	1,367	833	35
Parkersburg	595	2,631	1,569	45
Ste. Marie	99	430	570	19
Sailor Springs	423	943	2,097	66
Schnell	83	257	1,543	9
Sims and North	1,488	3,245	5,475	93
Miscellaneous	288	338	1,662	73
Total	15,238	108,037	93,599	2,187
Wabash River area:				
Calvin and North	140	140	1,060	31
Friendsville	130	140	460	24
Grayville and West	88	253	447	28
Inman and E, W and N	795	1,802	3,528	94
Iron	313	2,707	1,099	57
Keensburg Consol.	1,138	8,909	6,561	271
Mount Carmel	854	3,595	2,195	230
New Haven	89	387	283	21
New Harmony Consol.	5,257	24,210	23,410	653
Omaha	182	808	482	21
Phillipstown	1,112	1,419	3,061	73
Roland	1,120	4,113	5,437	130
South Maunie	407	1,386	1,434	83
Stokes	502	1,159	2,341	39
Storms	463	4,139	1,201	137
Miscellaneous	291	2,020	1,800	89
Total	12,881	57,181	56,719	1,981
La Salle anticline:				
Allendale	718	5,931	7,069	270
Bridgeport	1,880	231,963	23,437	3,180
Casey	330	53,832	4,368	2,950
Robinson	1,273	149,985	15,515	5,880
Miscellaneous	.....	256	.....	.....
Total	4,217	441,967	50,389	12,280
Others:				
Colmar-Plymouth	99	2,991	979	210
St. Jacob	431	694	1,816	27
Miscellaneous	61	2,116	463	80
Total	591	5,801	3,258	317
Total Illinois	77,637	1,009,682	415,135	23,623

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by the end of the year. North Calvin in White County opened, in 31-3s-14w early in the year, had 18 oil wells and 3 dry holes before the year closed. The South Covington pool in Wayne County, opened in 12-2s-6e, in January developed 10 oil wells during the balance of the year. None of the other 1943 discoveries showed such endeavor on the part of operators, a considerable number of new pools never having gone beyond the 1-well stage.

The big development was of the older pools like the consolidated Clay City field in Clay and Wayne counties, where 54 new wells were completed; Sailor Springs with 31 new oil wells, and Dale Hoodville with 22 new oil wells.

At the close of the year the fields discovered since 1936 contained a total of 12,407 oil wells.

ILLINOIS

Wildcat Completions in 1943

County—	Comp.	Oil	Prod.	Gas	Dry
Adams	1	0	0	0	1
Bond	10	0	0	0	10
Brown	1	0	0	0	1
Champaign	1	0	0	0	1
Christian	4	0	0	0	4
Clark	5	1	15	0	4
Clay	29	8	1,527	0	21
Clinton	23	0	0	1	22
Coles	8	1	45	0	7
Crawford	5	0	0	0	5
Cumberland	8	0	0	0	8
Douglas	1	0	0	0	1
Edgar	1	0	0	0	1
Edwards	26	13	2,004	0	13
Effingham	12	0	351	0	10
Fayette	16	1	26	0	15
Ford	3	0	0	0	3
Franklin	26	8	875	0	18
Fulton	1	0	0	0	1
Gallatin	4	0	0	0	4
Greene	1	0	0	0	1
Hamilton	17	1	143	0	16
Hancock	1	0	0	0	1
Henderson	2	0	0	0	2
Jackson	1	0	0	0	1
Jasper	7	1	154	0	6
Jefferson	31	7	627	0	24
Kankakee	1	0	0	0	1
Lawrence	8	0	0	0	8
Madison	9	2	206	0	7
Marion	14	1	155	0	13
Mason	1	0	0	0	1
Monroe	1	0	0	0	1
Montgomery	7	0	0	0	7
Moultrie	1	0	0	0	1
Perry	2	0	0	0	2
Pike	1	0	0	0	1
Putnam	1	0	0	0	1
Randolph	3	0	0	0	3
Richland	14	2	80	0	12
St. Clair	18	0	0	0	18
Saline	2	0	0	1	1
Shelby	9	0	0	0	9
Sangamon	1	0	0	0	1
Union	2	0	0	0	2
Wayne	48	11	1,042	0	37
Wabash	25	6	592	1	18
Warren	1	0	0	0	1
Washington	16	1	46	0	15
Wells	1	0	0	0	1
White	41	9	490	1	31
Williamson	5	0	0	0	5
Total	477	75	9,178	4	398

Completions by Fields in 1943

Field—	Comp.	Oil	Prod.	Gas	Dry
Aden	10	8	1,042	0	2
Akin	7	2	273	0	5
Albion	4	3	339	0	1
Allendale	19	8	648	0	11
Barnhill	3	2	84	0	1
Belle Rive	13	8	1,035	0	5
Benton	7	4	148	0	3
Bible Grove	30	29	3,500	0	1
Blairsville	18	14	3,289	0	4
Browns	2	1	209	0	1
Bogota	6	5	1,384	0	1
Boulder	14	7	1,717	2	5
Boyleston	2	2	367	0	0
Bridgeport	5	5	217	0	0
Bungay	12	11	3,906	0	1
Calvin	3	2	113	0	1
Clay City	54	45	8,302	0	9
Coil	5	3	116	0	2
Concord	8	4	444	0	4
Cordes	8	8	169	0	0
Covington	12	10	1,593	0	2
Dale-Hoodville	49	40	8,637	0	9
Divide	4	3	706	0	1
Dix	4	3	91	0	1
Dundas	7	4	143	0	3
East Albion	1	1	47	0	0
East Barnhill	10	9	5,043	0	1
East Centerville	4	3	219	0	1
East Dundas	5	1	24	0	4
East Flora	1	1	140	0	0
East Inman	24	22	2,411	0	2
Exchange	4	2	86	0	2
Fairfield	2	1	280	0	1
Flora	4	4	312	0	0
Friendsville	30	23	1,606	0	7
Geff	2	2	194	0	0
Golden Gate	2	1	89	0	1
Grayville	5	3	177	0	2
Hill	2	2	282	0	0
Herald	4	4	106	0	0
Iola	84	71	8,824	0	13
Johnsonville	6	4	651	0	2
Keensburg	11	7	474	0	4
Kenner	8	8	552	0	0
King	24	15	1,770	0	9
Lancaster	6	6	341	0	0
Lawrence	7	4	230	0	3
Louden	19	15	1,196	0	4
Maple Grove	25	15	4,592	0	10
Markham City	7	5	1,348	0	2
Maunee	6	5	268	0	1
Mount Carmel	80	72	7,589	1	7
Mount Erie	5	3	171	0	2
Mount Vernon	6	4	439	0	2
New Harmony	33	26	3,272	0	9
Noble	12	11	1,310	0	1
North Aden	5	4	449	0	1
North Benton	3	3	142	0	0
North Boos	5	3	723	0	2
North Calvin	22	18	1,670	0	4
North Markham City	7	5	4,029	0	2
North Maunee	2	1	117	0	1
North Noble	3	3	94	0	0
North New Harmony	1	1	48	0	0
North Simms	23	16	2,634	0	7
Olney	5	3	210	0	2
Patoka	6	4	253	0	2
Patton	3	3	360	0	0
Phillipstown	48	42	4,894	0	6
Roland	8	5	200	0	3
Rural Hill	22	17	1,855	0	5
Sailor Springs	31	26	1,862	0	5
St. Jacob	8	8	718	0	0
St. James	2	2	90	0	0
Salem	31	27	1,643	0	4
Schnell	2	2	1,069	0	0
Sims	6	4	252	0	2
South Bible Grove	3	2	185	0	1
South Covington	10	8	1,234	0	2
South Ellery	2	2	179	0	0
South Grayville	1	1	92	0	0
Southeast Clay City	2	2	174	0	0
South Johnsonville	2	2	526	0	0
South Lawrence	32	19	1,630	0	13
South Mason	22	17	1,002	0	5
South Mount Erie	6	4	577	0	2
South Sailor Springs	14	9	877	0	5
South Stokes	1	1	167	0	0
Stokes	17	14	1,054	0	3
Walpole	31	24	3,210	0	7
West Coil	3	3	986	0	0
West Frankfort	16	10	820	0	6
West Inman	16	14	558	0	2
West Lancaster	4	2	621	0	2
Whittington	2	1	199	0	1
Woodlawn	14	13	1,012	0	1
Miscellaneous	90	38	1,276	5	47
Wildcats	477	75	9,178	4	398
Total	1,751	1,046	131,306	12	693

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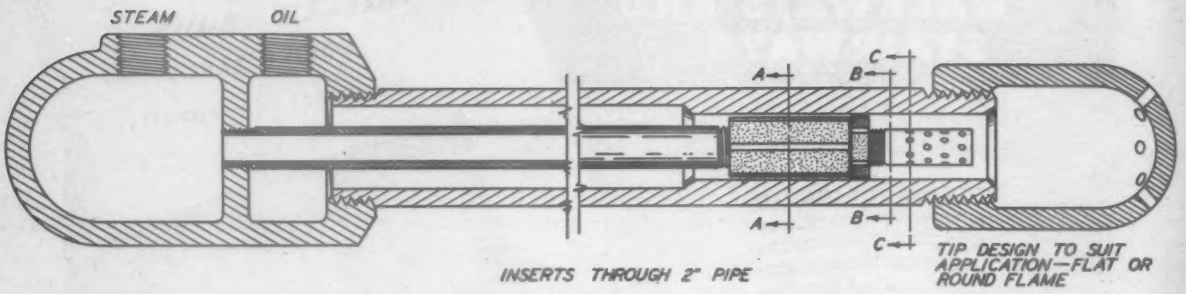

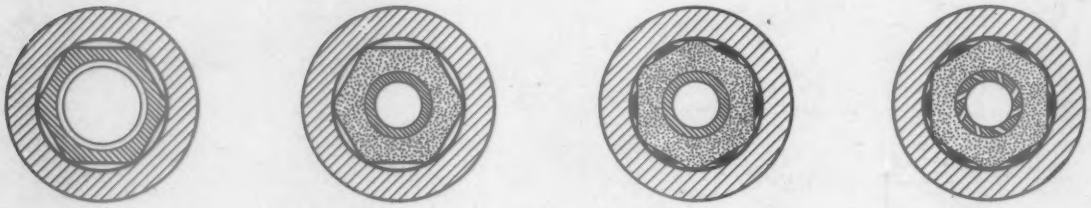

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Several New Pools Indicate Major-Production Caliber

by T. F. Smiley

WILDCAT operations in the upper Texas Gulf Coast territory in 1943 showed 163 wells finished, compared with 121 in 1942; but the percentage of dry holes was heavy, only 13 oil producers and 6 gas wells being scattered through the list. Up to the end of the year none of the new pools opened had assumed major importance, though several gave promise of adding substantially to production with later development.

Wildcatting, which had displayed no marked aggressiveness during the second half of the year, picked up in late December, four exploratory tests being staked in as many counties. Manpower shortage had become a serious handicap, and it was declared more new fields might have been opened but for this obstacle. Various instances of projects being held up for lack of drilling crews were reported, and some contractors said they had quit trying to use their rigs because of the impossibility of finding experienced men to handle them.

Among 11 new fields, Wharton County contributed four. Wharton opened and closed the year's roster of discoveries. In January Continental Oil Co. found the Louise field, 8 miles north of Louise, Tex., with its 1 Allenson, which showed initial daily production of 2,500,000 cu. ft. of gas. In the last week of December Seaboard Oil Co. struck oil at its 1 Duson, 6 miles south of El Campo, at the southern tip of the county, near the Jackson County line. Sixteen feet of the Frio sand was penetrated. The Duson had not been officially com-

PRODUCTION AND RESERVES—TEXAS GULF COAST

(In thousands of barrels)

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Austin County:				
Raccoon Bend	2,636	28,298	22,702	157
Miscellaneous	21	21	979	1
Total	2,657	28,319	23,681	158
Brazoria County:				
Chocolate Bayou	77	373	1,127	2
Danbury	334	1,102	2,198	19
Hastings	17,916	63,620	306,380	688
Lochridge	665	4,554	5,696	39
Manvel	2,767	25,922	20,078	162
Old Ocean	4,819	22,945	30,555	117
Rowan	163	461	1,539	7
West Columbia	2,120	91,625	19,375	144
Miscellaneous	121	8,441	3,039	32
Total	28,982	219,043	389,987	1,210
Chambers County:				
Anahuac	8,839	32,485	257,515	354
Barbers Hill	2,358	79,224	15,776	125
Cedar Point	660	1,930	5,570	17
Cotton Lake and South	525	4,180	6,820	42
Fig Ridge	819	1,095	6,405	24
Oyster Bayou	1,166	1,342	8,858	20
Red Fish Reef	603	1,038	5,362	15
Seabreeze	364	867	5,133	11
Turtle Bay	528	3,908	4,382	40
Willow Slough	145	593	1,407	7
Miscellaneous	36	1,120	1,150	4
Total	16,043	125,902	318,358	659
Colorado County:				
Sheridan	84	205	695	3
Miscellaneous	45	143	607	4
Total	129	348	1,302	7
Galveston County:				
Alta Loma	178	666	1,434	6
Caplen	313	825	2,975	16
Dickinson-Gillock	1,801	16,849	19,151	151
High Island	811	19,804	6,196	56
Hitchcock	179	1,229	1,371	12
League City	805	3,107	7,093	37
Miscellaneous	22	127	173	1
Total	4,109	42,607	38,393	279

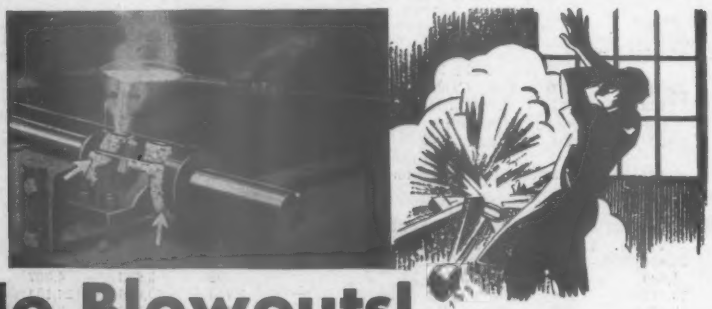
	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Fort Bend County:				
Big Creek	178	10,318	2,182	16
Blue Ridge	195	11,453	2,547	47
Clodine	282	495	2,505	22
Sugarland	1,788	33,144	56,856	50
Thompson	10,115	48,928	176,072	341
Miscellaneous	63	6,557	883	12
Total	12,621	110,895	241,045	488
Harris County:				
Clear Lake	1,432	1,955	26,045	38
Dyersdale	609	1,391	5,609	49
Eureka	492	3,693	4,807	23
Fairbanks	2,733	13,866	26,134	293
Goose Creek	384	78,175	2,825	84
Humble	794	125,850	9,150	230
Mykawa	135	4,874	1,051	29
Pierce Junction	527	36,676	5,644	62
Satsuma	143	798	1,502	10
South Houston	1,595	9,030	17,930	89
Tomball	3,256	26,132	28,868	452
Webster	11,473	24,692	325,908	214
Miscellaneous	226	1,406	2,894	20
Total	23,801	327,828	458,367	1,593
Hardin County:				
Arriola	104	2,429	971	12
Batson	224	41,983	2,517	158
Saratoga	231	30,200	2,300	212
Silsbee and West	706	4,069	7,051	41
Sour Lake	371	80,610	4,430	147
Miscellaneous	8	8	992	1
Total	1,646	159,319	18,261	571
Liberty County:				
Cleveland	79	1,495	780	5
Esperson and South	889	9,308	8,192	78
Hankamer	261	6,682	3,543	33
Hardin	1,346	9,823	11,877	135
Hull	1,875	98,030	16,970	170
Martha	195	650	1,750	12
South Liberty	121	16,014	1,186	37
Miscellaneous	64	2,414	1,086	4
Total	4,770	144,216	45,384	483

(Continued on Next Page)

PRODUCTION AND RESERVES—TEXAS GULF COAST (Continued)

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Jackson County:				
Cordele	270	2,642	4,156	44
Francitas	80	403	1,197	11
Ganado	396	962	2,548	40
Ganado, West	444	885	16,635	34
Harmon	185	297	3,333	9
Lolita	1,894	5,813	68,187	175
Maurbro	397	1,102	16,398	66
Mauritz and West	341	946	1,164	21
Mayo	326	427	5,573	35
North La Ward	740	1,314	23,686	94
West Ranch	6,782	18,045	219,955	384
Miscellaneous	77	144	3,336	9
Total	11,934	32,950	363,170	922
Jefferson County:				
Amelia	1,681	8,789	15,211	103
Clam Lake	199	624	3,876	14
Fannett	1,157	4,570	2,930	36
La Belle	149	473	1,827	5
Lovells Lake	2,043	6,342	41,758	99
Nome	633	3,475	5,525	35
South China	261	677	2,823	15
Spindletop	374	128,780	2,920	723
Stowell	1,783	2,049	22,951	44
West Beaumont	714	3,299	6,701	54
Miscellaneous	.....	25	.....	.....
Total	8,994	161,105	106,522	531
Matagorda County:				
Bay City and North	251	9,204	1,796	40
Hamman	532	992	13,208	33
Markham	501	4,093	4,432	20
North Markham	1,376	6,639	16,361	59
Miscellaneous	121	1,646	1,044	8
Total	2,781	22,574	36,841	160
Montgomery County:				
Conroe	19,995	162,072	537,928	908
Miscellaneous	11	103	147	2
Total	20,006	162,175	538,075	910

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Orange County:				
Orange and North	526	36,634	4,366	76
Port Neches and West	534	6,832	4,568	40
Total	1,060	43,466	8,934	119
Polk County:				
Livingston	545	7,833	5,167	72
Segno	1,612	8,134	13,866	108
Miscellaneous	91	596	904	8
Total	2,248	16,563	19,937	188
San Jacinto County:				
Mercy	892	1,051	8,549	37
Miscellaneous	9	11	.....	.....
Total	901	1,062	8,549	37
Tyler County:				
Camp Eleven	91	165	1,035	2
Joe's Lake	517	3,740	4,260	41
Miscellaneous	51	89	1,511	3
Total	659	3,994	6,806	46
Waller County:				
Katy, North	56	56	944	8
Washington County:				
Clay Creek	219	4,963	2,037	46
Miscellaneous	2	386	4	6
Total	221	5,349	2,041	54
Wharton County:				
Boling	378	8,337	3,528	46
Hillje	170	670	1,430	15
Louise	407	4,232	3,768	36
Magnet-Withers	6,072	20,128	64,872	379
Pickett Ridge	723	6,882	7,118	64
Miscellaneous	.....	47	1,153	.....
Total	7,750	40,296	81,869	540
Total Texas Gulf Coast	151,368	1,648,067	2,708,466	8,963



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pleted, but reports were to the effect that it was flowing 165 bbl. of oil daily.

The discovery is on a 160-acre lease, part of a 7,800-acre block controlled by Seaboard. Sun Oil Co. has 120 acres offsetting the pool opener to the south. Cox & Hamon have an 80-acre lease ½ mile north of the well.

Jefferson County led in point of wildcat activity with 15 completions, one of which, Glen H. McCarthy 1 Hanker-McLean, extended the Stowell field 2 miles to the north, in the Winnie area, with a 486-bbl. producer in the Frio sand. Three dry holes had been drilled previously to the north of McCarthy's test, all indicating structure. The Stowell field underwent the most spirited drilling campaign of the year in the upper Gulf Coast region, 33 wells being finished, of which 24 were producers, with an average daily yield of about 500 bbl.

Discovery in March of an excellent oil sand in the big Katy gas field retained its rating as the most signal development of the year. Stanolind Oil & Gas Co. 1 Pattison was being drilled in Waller County, 2½ miles north of the nearest gas production in the Katy field when it came upon the unsuspected oil sand.

The Rockland area in Tyler County was being watched with interest at the year's end, as tests indicated that a new field was about to be opened by Humble Oil & Refining Co. 1

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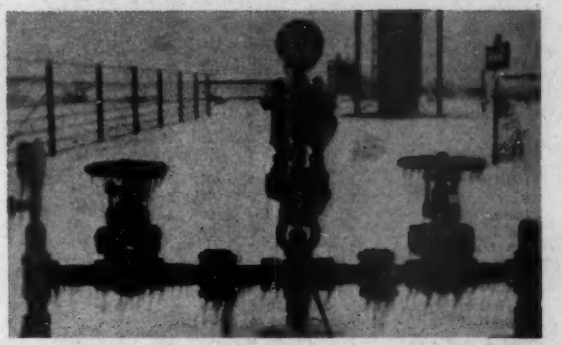
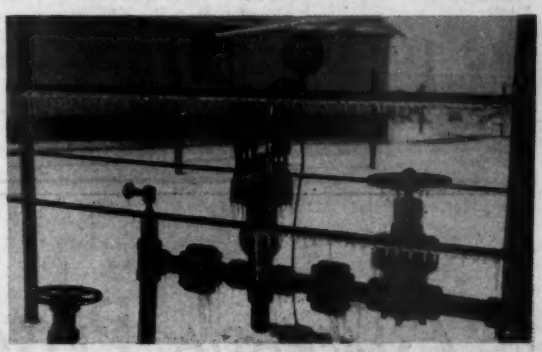
Nixon S-F-D Regulators are made in both Pressure Reducing and Back Pressure types. Write for complete descriptive literature, giving details about their many other advantages. Address your nearest Wilson Supply Co. store or sales office.





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COMPLETE FISHING TOOL SERVICE

Kountze. On one potential test the well flowed 43 bbl. of oil in 22 hours through perforations at 3,415-33 ft.

TEXAS GULF COAST

Summary of Wildcats Completed, 1943

County—	Comp.	Oil	Prod.	Gas	Dry
Brazoria	10	1	620	1	8
Brazos	4	0	0	0	4
Burleson	2	0	0	0	2
Chambers	10	0	0	2	8
Colorado	4	1	122	0	3
Fayette	2	0	0	0	2
Fort Bend	13	0	0	0	13
Galveston	1	0	0	0	1
Grimes	1	0	0	0	1
Hardin	2	0	0	0	2
Harris	11	1	40	0	10
Jackson	34	2	173	0	32
Jasper	2	0	0	0	2
Jefferson	16	1	486	0	15
Lavaca	2	0	0	0	2
Liberty	5	2	860	0	3
Madison	1	0	0	0	1
Matagorda	12	2	375	1	9
Montgomery	4	1	244	0	3
Polk	2	0	0	0	2
San Jacinto	5	0	0	0	5
Trinity	1	0	0	0	1
Tyler	2	0	0	0	2
Waller	2	1	154	0	1
Washington	1	0	0	0	1
Wharton	14	1	72	0	11
Total	163	13	3,156	6	144

Summary of Wells Completed, 1943

Field—	Comp.	Oil	Prod.	Gas	Dry
Abel Borden	1	0	0	0	1
Aldine	1	1	106	0	0
Alief	1	1	40	0	0
Alta Loma	2	1	24	0	1
Anahuac	4	1	455	0	3
Bailey's Prairie	1	0	0	0	1
Big Creek	1	0	0	0	1
Big Hill	1	0	0	0	1
Blue Ridge	3	0	0	0	3
Boling	15	8	2,012	0	7
Buckeye	3	1	104	0	2
Camp Eleven	2	0	0	0	2
Caplin	2	1	60	1	0
Cedar Point	2	2	328	0	0
Chesterville	1	1	132	0	0
Citrus Grove	1	0	0	1	0
Clinton	1	0	0	0	1
Clodine	15	10	1,302	0	5
Collier	8	2	100	1	5
Cottonwood	1	1	92	0	0
Damon Mound	2	0	0	0	2
Danbury	6	5	830	1	0
Dyersdale	3	2	243	0	1
Esperson	8	5	1,214	0	3
Fairbanks	2	0	0	1	1
Fig Ridge	4	3	828	0	1
Fostoria	1	0	0	0	1
Francitas	2	1	137	0	1
Fred	2	1	123	0	1
Friendswood	3	3	1,507	0	0
Canado	13	9	682	0	4
Halls Bayou	2	1	620	0	1
Hardin	1	0	0	0	1
Harmon	5	4	404	0	1
High Island	1	0	0	0	1
Hitchcock	1	1	122	0	0
Hull	3	3	169	0	0
Humble	3	3	999	0	0
Katy	17	10	1,745	2	5
Kirby	4	3	908	0	1
Lake Creek	3	3	1,867	0	0
Little Kentucky	2	2	264	0	0
Lochridge	3	2	229	0	1
Livingston	1	0	0	0	1
Louise	1	0	0	1	0
Lovell Lake	12	10	1,224	0	2
Lucky	1	1	635	0	0
Manvel	1	0	0	0	1
Markham	2	1	75	0	1
Maurbro	9	9	2,191	0	0
Mauritz	2	1	84	0	1
Mayo	12	12	1,100	0	0
Mercy	8	7	1,056	0	1
Millican	3	0	0	0	3
Mustang Creek	2	0	0	0	2
Needville	1	0	0	0	1
North Bay City	2	2	424	0	0
North Houston	1	0	0	1	0
North LaWard	26	23	2,535	2	1
North Markham	11	11	2,702	0	0
Northwest Louise	1	0	0	1	0
Old Ocean	6	6	4,306	0	0
Oyster Bayou	8	6	3,551	0	2
Pierce Junction	1	1	116	0	0
Pinehurst	2	1	224	0	1
Port Neches	1	1	110	0	0
Saratoga	1	1	10	0	0
Satsuma	2	1	95	0	1
Seabreeze	3	0	0	0	3
Sour Lake	9	6	775	0	3
South Anahuac	2	0	0	1	1
Southeast Gillock	1	0	0	0	1
South Houston	1	1	76	0	0
Sterling	1	0	0	1	0
Stewart	6	3	286	1	2
Stowell	33	24	12,792	1	8
Sugarland	1	0	0	0	1
Sugar Valley	1	1	132	0	0
Texana	1	0	0	1	0
Thompson	1	0	0	0	1
Turtle Bay	2	2	335	0	0
West Beaumont	1	0	0	1	0
West Columbia	1	1	552	0	0
West Ganado	3	2	157	0	1
West Mauritz	9	7	1,442	0	2
West Ranch	19	13	1,726	5	1
Willow Slough	1	0	6	1	0
Wildcats	143	0	0	0	143
Total	513	245	56,386	24	244

Completions by Months

Month—	Comp.	Oil	Gas	Dry	Footage
January	33	18	1	14	218,166
February	27	13	4	10	169,668
March	25	14	1	10	170,469
April	33	22	0	11	229,873
May	40	15	2	23	312,102
June	42	22	1	19	377,002
July	48	25	1	22	296,317
August	46	19	1	26	268,535
September	65	25	5	35	543,915
October	50	21	1	28	286,442
November	51	23	2	26	365,400
December	53	28	5	20	381,107
Total	513	245	24	244	3,618,996

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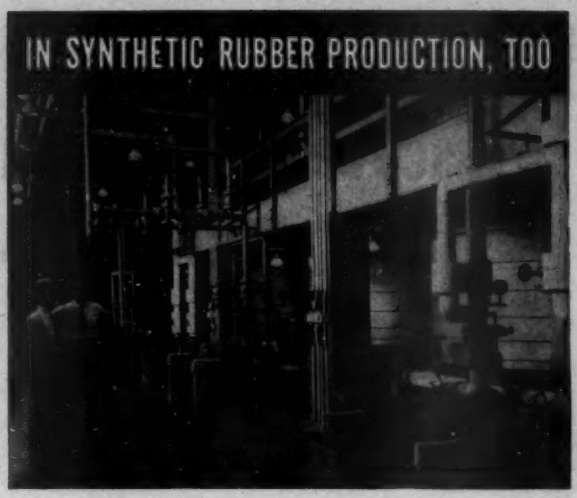

IT'S GOULDS

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The manufacture of synthetic rubber requires the handling of tremendous quantities of liquids ranging from those containing a high percentage of solids to hydro carbons with specific gravity as low as .568 and at temperatures as high as 410° F.

Here's a tough liquid handling problem that in its entirety could not be met by any one pump, but only by "the pump for the job." Because of Goulds 96 years of specialized pumping experience, of manufacturing and engineering pumps only, it was logical that the engineers designing these plants should turn to Goulds for the pump "know how" that would solve their liquid handling problems. From a single source of supply they were able to obtain the right pump for many of the applications involved . . . the one pump that would do each job best . . . that would help them swing production of this vital war material into high gear in the shortest possible time.

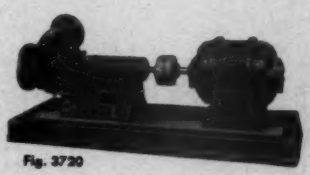
Fig. 3720

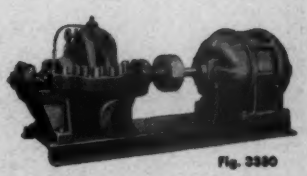
Fig. 3380

Typical Goulds Pumps used in the manufacture of Synthetic Rubber.

Goulds PUMPS, INC.
SENECA FALLS, NEW YORK

Discovery Wells Increase 32 Per Cent

by Carl Hoot

THE year 1943 was a fairly active one for Kansas operators. Drilling increased considerably over the previous year, with total completions up 14 per cent. Wildcatters also had a good year, showing an increase of 32 per cent over 1942. Twenty-two discoveries and 10 extensions, including a number of small wells, added some 38,000,000 bbl. of oil to the state's known oil reserves.

Probably the most important single development of the year, the Carmi Arbuckle lime pool of Pratt County had spread over some 2,500 acres at the end of the year and the proven reserve was conservatively estimated at 15,000,000 bbl. Hollow Drilling Co. opened the Carmi field at its 1-B Brown in SW SW SE 29-26-12w, which was completed in February for a flow of 40 bbl. of oil an hour. In the same month, Skelly Oil Co. completed its 1-B Knopp, SW

PRODUCTION AND RESERVES—KANSAS

(In thousands of barrels)

WESTERN KANSAS

(In thousands of barrels)

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Barber County:				
Whelan	182	883	1,860	18
Miscellaneous	96	259	1,771	11
Total	278	1,142	3,631	29
Barton County:				
Ainsworth district	557	3,182	6,858	72
Beaver-Feltes	560	2,525	5,835	54
Beaver and North	292	1,833	3,327	38
Feltes	268	692	2,508	16
Bloomer-Breford	3,136	15,996	22,104	259
Bloomer	2,813	14,130	19,100	231
Breford	323	1,866	3,004	28
Kraft-Prusa	1,890	9,335	27,115	287
Lanterman	123	551	1,089	11
Silica-Raymond	9,825	62,304	76,376	908
Silica	8,779	53,639	67,521	785
Raymond	785	7,793	6,707	66
Wenke and West	123	609	891	11
Miscellaneous	124	263	1,227	52
Miscellaneous	185	1,494	2,216	33
Total	18,276	93,144	141,583	1,624
Clark County:				
Morrison	5	136	64	2
Ellis County:				
Bemis-Walters	6,720	30,371	52,849	504
Bemis-Shutts	5,764	27,042	45,348	433
Koblitz	89	306	694	8
Marshall	310	1,210	2,590	25
Walters	557	2,483	4,217	38
Blue Hill	186	733	1,667	18
Burnett and South	4,948	14,376	41,624	207
Miscellaneous	275	1,939	3,871	56
Total	17,129	47,419	100,011	785
Ellsworth County:				
Stoltenberg-Wilkins	3,083	14,218	24,782	251
Stoltenberg	2,190	10,716	17,744	182
Wilkins-Heiken	893	3,502	7,038	69
Lorraine	401	9,143	3,277	75
Miscellaneous	6	6	.....	4
Total	3,490	23,367	28,059	330
Finney County:				
Nunn	29	176	224	2
Graham County:				
Morel	570	1,089	4,579	22
Miscellaneous	15	52	118	3
Total	585	1,141	4,697	25
Harvey County:				
Halstead	78	1,471	629	19
Hollow-Nikkel	285	19,416	2,184	69
Sperling	50	444	456	7
Total	413	21,331	3,269	95
Kearny County:				
Patterson	42	82	398	3
Kingman County:				
Cunningham	678	4,117	7,883	102
McPherson County:				
Bornholdt-Welch	1,830	10,584	14,516	103
Bornholdt and West	1,767	6,095	13,805	146
Welch and East	63	4,489	711	27
Crowther	189	193	1,807	14
Graber-Hesston	619	7,573	3,927	123
Henne	245	406	2,194	20
Johnson	95	2,814	816	14
Lindsborg	924	1,295	7,205	87
Ritz-Canton	960	37,016	7,184	223
Roxbury and South	535	1,468	4,732	41
Voshell	630	24,698	4,802	89
Miscellaneous	140	2,706	1,094	57
Total	6,171	88,803	48,277	851
Ness County:				
Aldrich	145	757	1,843	12
Norton County	9	20	180	1
Pawnee County	366	973	4,147	26
Phillips County:				
Dayton	232	369	2,831	26
Ray and Southeast	1,140	2,084	9,116	71
Miscellaneous	37	58	862	5
Total	1,409	2,511	12,309	105
Pratt County:				
Carmi	662	662	14,338	36
Iuka	209	443	1,657	23
Miscellaneous	104	468	3,232	19
Total	985	1,573	19,227	78
Reno County:				
Burrton	1,740	36,921	8,879	396
Hilger	399	2,767	3,533	35
Peace Creek	2,914	3,809	16,191	139
Miscellaneous	134	3,479	1,121	46
Total	5,187	46,976	29,624	570
Rice County:				
Chase-Campbell	3,750	29,907	30,093	405
Geneseo-Edwards	3,941	17,707	30,093	279
Geneseo	2,850	12,642	22,358	192
Edwards	1,091	5,065	7,735	87
Haferman	88	603	737	10
Orth	138	1,029	971	18
Smyres	275	403	1,737	23
Wherry	434	8,950	2,730	130
Miscellaneous	259	2,702	1,898	47
Total	8,885	71,361	68,259	912
Rooks County:				
Laton	417	2,143	3,857	87
Westhusin	140	664	1,336	14
Miscellaneous	119	506	1,334	18
Total	676	3,313	6,527	119
Rush County:				
Otis-Albert	490	3,195	4,705	41
Russell County:				
Atherton-Russell	568	7,088	5,332	83
Atherton and North	172	1,452	1,596	34

(Continued on page 241)

BIRTH OF AN IDEA

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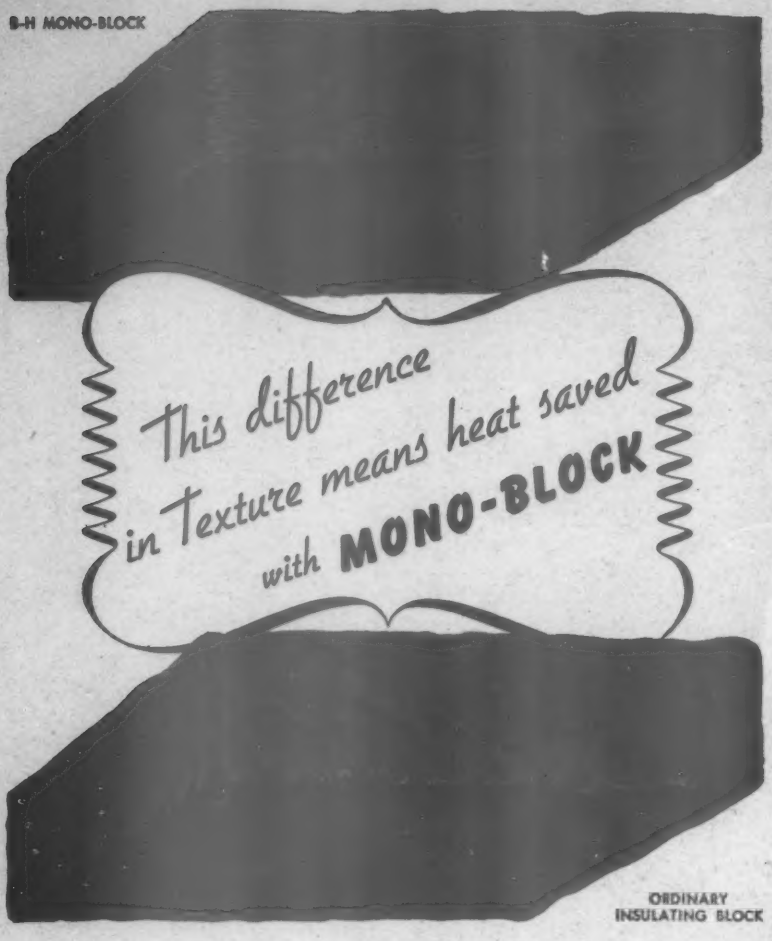

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SW SE 25-26-13w, 1½ miles to the west. Both wells were large Arbuckle producers. However, the Skelly well, located about 2 miles north of the Iuka Simpson field, was then designated as North Iuka. Offset drilling got under way and by April the North Iuka and Carmi pools were joined and called Carmi. At the end of the year the limits of the field had not been determined in any direction, with the exception of a few small Simpson wells which were brought in bordering the Iuka area. The only dry holes drilled during the year were more than ½ mile from the southern border and are more properly in the Iuka area. A number of locations remain to be drilled within the field but the present development is spreading east and west. Many operators feel that Carmi will eventually surpass the Peace Creek pool of Reno County in production if not in extent. Monthly production at Carmi at the end of the year was around 145,000 bbl., slightly less than 100 bbl. per well a day.

The joining of the Peace Creek and Zenith Viola lime pools was another noteworthy development. While activity fell off in some areas of the Peace Creek pool, considerable drilling took place between the two fields and entirely eliminated the gap separating them. Production at Peace Creek fell off sharply during the last half of 1943. However, the field has not been defined entirely and during the latter months of the year a number of extensions were made along the middle eastern border. These wells have surpassed the average in initial production, ranging from 250 to 500 bbl. Future development here may be expected along this eastern border, in Sections 12, 13, 23 and 24 of Township 23 south, 10 west.

Commercial production in the Salina basin was developed during the year. The Salina pool, in 14s-2w, indicates a trend running north from Zenith, Wherry and the Lindsborg pools, all of which are in the Viola lime. The Salina discovery was comparatively small, however, and at the end of the year only one offset had been completed. Discovery of the Hunter Mississippian chat pool, in 16s-2w, extends the trend running north from the Burrton, and shoestring pools north of it, through McPherson and Roxbury. The Hunter field has prospects of becoming a major producing area. By the end of the year it had 12 oil wells and only one dry hole. On the basis of information revealed by drilling here, Mississippian production appears likely to develop to the north of the field. Deep Rock Oil Corp.'s discovery, the 1 Hunter in NE NW SW of 20-16s-1w, is one of the lowest wells in the pool and the highest point at which the Mississippi has been found, is the 1 Tressin in SW NE of Section

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20. The field's one dry hole, Gore 1 Redden in NE SE of Section 20, on the eastern flank, is the only defining well so far. This reveals a possible fault on that side. The area north and east of Hunter, from 14s-2w northeast to 16s-3e, should be favorable for future Mississippi and Viola lime production.

Some operators feel that Arbuckle oil in Kansas has been about two-thirds produced and that the state's future lies mainly in the Mississippi and Lansing limes. Development is continuing along the Barton Arch and there are promising structural highs in northwest Kansas. The southwest portion of Norton County is one such area and should yield oil in the Lansing.

The Studley pool of Sheridan County may be the forerunner of such Lansing production in northwestern Kansas. At the end of the year there were five wells finished, producing in the Lansing at around 3,800 ft., and all of which made an average of better than 300 bbl. a day initial potential. Union Oil Co. of California holds most of the acreage around the discovery and is developing the field slowly. Several additional tops are needed to clarify the structural pattern in the pool, but failure of the company's 5 and 6 Pratt Ranch would indicate a north and south trend at this time. The No. 5, in the southwest corner of the pool in NW SW SW of 23-8s-26w, was reported to have found the Lansing higher than any well in the field. The No. 6 is on the southeast flank of the field.

Forest City Basin

Activity in the Forest City Basin was slow during 1943. Nebraska had 7 oil wells and 35 dry holes. The basin area of Kansas had 12 oil wells. Missouri had 2 oil, 1 gas and 21 dry holes and Iowa had 1 dry hole. Prospects for future drilling in Nebraska will probably be in the southeastern section of the state, where a number of companies had short-term leases requiring drilling over the immediate future. On the other side of the state, along the Cambrian Arch which continues north and west from the Barton Arch in Kansas, oil companies hold long-term leases and it is doubtful if 1944 will see much development.

KANSAS
Completions by Fields

Fields—	Comp.	Oil	Prod.	Gas	Dry
Ainsworth	11	7	2,471	0	4
Barry	11	9	2,697	0	2
Beaumont	6	4	145	0	2
Bemis-Schutts	20	9	5,503	0	11
Bloomer	9	4	1,173	0	5
Boxberger	2	1	796	0	1
Carmi	64	64	17,401	0	0
Chase	46	36	9,410	0	10
Chitwood	3	3	1,070	0	0
Couch	3	1	401	1	1
Crowther	11	11	6,405	0	0
Cunningham	9	8	2,428	0	1
Curtis	2	1	341	0	1
Dayton	7	7	1,670	0	0
Deerhead	3	1	25	1	1
Deichman	4	2	1,972	0	2
Drach	25	21	14,247	0	4
Dunn's Mill	3	0	0	0	3
Eberhardt	3	2	1,366	0	1
Eldorado	20	18	962	0	2
Ellis	8	8	4,010	0	0
Forest Hills	12	8	1,992	0	4
Frisbie	5	1	1,008	0	3
Genesco	3	2	636	0	1
Gorham	8	6	1,479	0	2
Greenvale	10	5	104	0	5
Hall-Gurney	40	30	7,943	0	10
Hansen	5	4	1,324	0	1
Hazel	4	2	609	0	2
Henne	11	7	2,492	0	4
Hunter	13	11	3,973	0	2
Iuka	12	5	570	0	7
Karber	2	1	324	0	1
Keesling	6	3	1,161	0	3
Kraft-Prusa	89	60	19,964	0	29
Lake City	1	1	201	0	0
Laton	9	9	1,636	0	0
Lindsborg	49	47	17,838	0	2
Lost Springs	47	29	3,848	6	12
McLouth	31	12	673	6	13
Merten	3	2	213	0	1
Morel	21	13	8,941	0	8
Peace Creek	27	25	8,412	0	2
Ray and S. E.	15	11	3,286	0	4
Raymond	3	3	893	0	0
Roxbury and S.	7	3	330	0	4
Silica	36	18	10,963	0	18
Smyres	3	2	350	0	1
Stafford	2	1	640	0	1
Stark, N.	8	6	1,907	0	2
Stoltenberg	26	19	4,864	0	7
Studley	5	3	991	0	2
Trapp	50	34	13,902	0	16
Vaughn	5	4	2,068	0	1
Virgil	15	13	338	0	2
Wilkins	11	4	2,216	0	7
Williamson	16	16	5,736	0	0

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Field—	Comp.	Oil	Prod.	Gas	Dry
Witt	9	9	4,391	0	0
Zenith	39	35	9,974	0	4
Butler County	28	16	1,122	1	11
Greenwood County	10	5	104	0	5
Wildcats	465	60	24,349	2	403
Miscellaneous	304	117	20,454	19	168
Total	1,735	880	273,932	38	819
1942 total	1,519	815	564,592	80	624

KANSAS WILDCAT COMPLETIONS

County—	Comp.	Oil	Prod.	Gas	Dry
Barber	14	5	3,109	0	9
Barton	34	9	1,764	0	25
Brown	3	0	0	0	3
Butler	8	3	110	0	5
Clark	1	0	0	0	1
Cowley	24	1	20	0	23
Decatur	3	0	0	0	3
Dickinson	9	1	223	0	8
Edwards	9	1	132	0	8
Elk	2	0	0	0	2
Ellis	23	6	2,775	0	17
Ellsworth	5	1	196	0	4
Gove	2	0	0	0	2
Graham	15	1	1,904	0	14
Greely	1	0	0	0	1
Greenwood	2	0	0	0	2
Harvey	4	0	0	0	4
Jefferson	4	0	0	0	4
Kearny	1	0	0	0	1
Kingman	5	0	0	0	5
Kiowa	2	0	0	0	2
Lincoln	1	0	0	0	1
Leavenworth	11	0	0	2	9
Logan	1	0	0	0	1
Marion	11	1	91	0	10
McPherson	34	1	400	0	33
Mitchell	2	0	0	0	2
Morris	2	0	0	0	2
Morton	1	0	0	0	1
Ness	1	1	200	0	0
Norton	3	0	0	0	3
Osborne	3	0	0	0	3
Ottawa	1	0	0	0	1
Pawnee	3	0	0	0	3
Phillips	12	3	2,081	0	9
Pottawatomie	1	0	0	0	1
Pratt	21	5	5,460	0	16
Reno	18	1	259	0	17
Rice	26	3	636	0	23
Rooks	24	0	0	0	24
Rush	10	0	0	0	10
Russell	32	5	878	0	27
Saline	18	2	276	0	16
Scott	1	0	0	0	1
Sedgwick	7	0	0	0	7
Shawnee	1	0	0	0	1
Sheridan	1	1	689	0	0
Stafford	41	9	3,146	0	32
Sumner	3	0	0	0	3
Thomas	1	0	0	0	1
Trego	1	0	0	0	1
Wallace	2	0	0	0	2
Total	465	60	24,349	2	403
Last year	351	37	28,658	3	311

Completions by Months

January	100	49	0	51	334,560
February	102	48	3	51	335,616
March	124	66	3	55	415,694
April	126	63	1	62	424,726
May	156	78	1	77	537,630
June	160	89	1	70	550,254
July	143	90	4	59	487,422
August	143	77	2	64	478,646
September	181	94	2	85	633,736
October	139	68	2	69	452,544
November	163	80	3	80	546,541
December	198	88	14	96	610,137
Total	1,735	880	36	819	5,807,506

PRODUCTION AND RESERVES—KANSAS (Continued)

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Russell and North	396	5,636	3,734	49
Big Creek-Vaughn	990	5,993	9,007	105
Big Creek and S and E	646	4,320	5,880	73
Vaughn	344	1,673	3,127	32
Fairport and North	620	16,249	5,151	142
Gorham	2,528	24,691	26,109	306
Greenvale and N and W	737	1,642	6,788	69
Hall-Gurney	3,780	17,367	40,633	451
Trapp-Sellens	10,840	48,845	88,455	925
Miscellaneous	370	1,116	2,894	82
Total	20,433	122,991	184,459	2,163
Salina County	59	59	1,741	9
Scott County	93	1,254	946	9
Sedgwick County:				
Eastboro	130	8,155	1,105	35
Goodrich	262	3,460	2,540	32
Greenwich	190	9,715	1,615	42
Robbins	72	3,113	1,647	50
Valley Center	275	20,829	2,471	65
Miscellaneous	.....	142	.....	.....
Total	929	45,414	9,378	222
Sheridan County	30	30	1,170	3
Stafford County:				
Bedford	238	723	1,377	21
Drach-Fischer-Gates	462	1,740	2,560	53
Drach	200	615	1,385	37
Fischer	32	173	267	3
Gates	130	952	908	13
Kipp	96	224	776	10
Leesburgh	463	1,039	3,461	16
Richardson	727	5,781	6,219	59
St. John	287	1,548	2,352	25
Sittner-Max	429	1,696	4,004	47
Sittner and South	259	1,234	2,466	30
Max-Mueller	170	462	1,538	17
Snyder and South	132	577	1,223	10
Stafford	526	1,131	4,569	22
Zenith	3,765	14,111	33,589	246
Miscellaneous	282	881	3,719	41
Total	7,214	29,451	63,849	550
Sumner County:				
Churchill	122	19,738	962	59
Oxford and West	187	15,395	1,605	46
Wellington	206	5,264	1,636	95
Miscellaneous	254	4,386	2,334	44
Total	769	44,783	6,537	220
Trego County	42	532	382	6
Total W. Kansas	89,817	656,051	753,329	8,922

EASTERN KANSAS

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Butler County:				
Augusta, N. and S.	416	48,067	3,333	240
Brandt-Senseburgh	159	970	1,370	49
Elbing	304	1,040	2,360	74
El Dorado	2,433	184,851	26,449	1,586
Fox-Bush	142	384	1,166	120
Keighly-Blankenship	129	484	966	142
Haverhill-Kramer	442	4,529	4,471	185
Garden-Schaffer-Reynolds	132	435	.....	37
Haverhill	140	3,600	.....	69
Kramer-Leon-Weaver-Stern	170	496	.....	59
Potwin	200	683	1,657	96
Miscellaneous	124	1,395	1,105	122
Total	4,349	242,403	42,777	2,584
Coffey County	17	41	159	31
Cowley County:				
Couch	197	585	1,385	21
David-Sherwood	83	869	741	30
Frog Hollow and East	479	1,572	1,728	50
Hittle	782	4,810	7,890	69
Rainbow-Gueda	270	14,202	2,398	129
Rock and North	127	2,283	2,127	47
Weathered	100	2,300	1,580	53
Winfield-State	151	473	2,787	106
Miscellaneous	386	6,406	6,054	136
Total	2,605	33,500	26,490	641
Elk County	250	987	2,303	340
Greenwood County:				
Atyco-Teeter-Pixley	648	60,646	7,584	401
Beaumont and South	215	.....	1,850	42
Quincy	133	In Virgil	1,150	108
Sallyards	287	28,513	2,337	159
Seely-Wick	917	37,444	8,984	636
De Malorie-Sowder	294	.....	.....	125
Hamilton	106	.....	.....	89
Madison	142	.....	.....	103
Seely-Wick	375	.....	.....	319
Virgil-Dunaway	533	33,196	5,186	483
Winterscheid	218	In Virgil	1,980	218
Miscellaneous	368	12,808	3,152	379
Total	3,281	172,607	33,233	2,413
Jefferson County:				
McLouth	143	235	1,265	26
Marion County:				
Lost Springs	662	5,035	4,565	142
Miscellaneous	142	2,188	1,172	41
Total	804	13,250	5,737	183
Eastern counties:				
Neosho Falls	472	.....	4,068	50
Miscellaneous	3,959	129,716	36,884	7,699
Total	4,431	129,716	40,952	7,749
Total E. Kansas	15,880	592,739	151,816	13,967
Total Kansas	105,697	1,248,790	905,145	22,889

NEBRASKA

Barada	235	948	919	.....
Falls City	532	3,068	1,012	.....
Miscellaneous	47	122	10	.....
Total	814	4,138	1,944	58

NORTH LOUISIANA, ARKANSAS

Activity Concentrated in South Arkansas District

SHREVEPORT, La.—North Louisiana operations and production dropped considerably during 1943, while the reverse was true in Arkansas. Total completions in Arkansas were up 59, or 32 per cent, and the number of oil wells found was 34 over the previous year. Production for the year increased 1,040,000 bbl. Oil production in southern Arkansas has increased steadily for the past 7 years, which has been attributed in part to the enactment of a conservation law to stabilize the oil industry of the state.

There were four discoveries during 1943. Three of these, however, were classified as extensions to producing areas. The West Atlanta pool of Columbia County, opened by Tide Water Associated Oil Co. and Seaboard Oil Co. in July at 1 A. O. Young, NE SE 18-18s-19w, opened a vast area for additional drilling. Located 4 miles west of the Atlanta pool, the discovery found oil both in the Cotton Valley and Smackover zones. Perforations were made at 7,212-16 ft. in the Cotton Valley which resulted in a flow of 387 bbl. of oil, cutting 5 per cent water. Perforations were then made in the Smackover at 8,294-8,300 ft. and the well flowed 779 bbl. of oil a day, with a flowing pressure of 1,110 lb. Shutin pressure was 3,400 lb. This was the largest discovery of the year. Production at the old Atlanta pool is in the Smackover at 8,200 ft.

Extension wells included Phillips Petroleum Co. and Kerlyn Oil Co. 1 Union Sawmill, NW SE NE 9-17s-13w, which was an east outpost to the Rainbow City pool of Union County. Production here was in a sand at 2,770-74 ft. This test was to the Smackover, found at 5,798 ft. and was plugged back from total depth of 5,835 ft. Top of Cotton Valley was at 3,818 ft.

The Stephens pool of Ouachita County, one of the most active fields during the year, was extended nearly 2 miles north and into Nevada County at McAlester Fuel Co. 1 J. R. Williams, SW SW SW 1-15s-20w. The well was larger than average in the field, pumping 366 bbl. of oil in sand at 3,040-46 ft. Considerable acreage was opened for additional drilling and two offsets had been completed by the end of the year.

In Columbia County, northwest of the Mount Holly pool of Union County, H. A. Wright and Crescent Drilling Co. 1 Cox, NE SE 8-17s-18w, found production in the Cotton Valley at 5,896 to 5,900 ft. Total depth was 7,410 ft. to test the Smackover lime. The well flowed 167 bbl. of oil in 24 hours.

According to the Arkansas Oil and Gas Commission, the pool of greatest production during the year was Magnolia of Columbia County, which produced in excess of 6,000,000 bbl. Smackover of Union and Ouachita counties was second with 4,500,0000 bbl.; the Schuler-Jones sand pool third with 4,000,000 bbl. and the Midway pool of Lafayette County fourth

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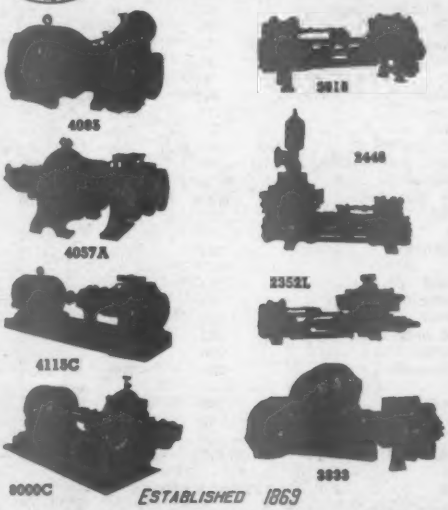

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with a little over 2,000,000 bbl.

The outlook for Arkansas operations over the coming year is good. Production and all operations have increased steadily over the past few years when the main producing zone was the Smackover lime. During 1943 the Cotton Valley formation was found productive in a number of pools and the bulk of wildcatting for the new year will be to explore these series.

North Louisiana Operations Down

The drop of 133 completions in North Louisiana, 30 per cent under 1942, was accounted for in part by the drilling up of the Haynesville field of Claiborne Parish.

The one discovery of the year, and one which holds a promise of opening an immense new area, but mostly to the east through the central part of Mississippi, is in the Marine Tuscaloosa. In Tensas Parish, Carter Oil Co. 1 R. D. Shelley, SW NE 19-11n-10e, opened the Holly Ridge pool in August with a flow of 388 bbl. of 37.5-gravity oil through 5/32-in choke. The sand was found from 8,399 to 8,434 ft. and shots were made at 8,399 to 8,410 ft. At the end of the year two offsets had been completed in the pool, both of which were as large as the discovery.

(Continued on page 246)

PRODUCTION AND RESERVES

(In thousands of barrels)

NORTH LOUISIANA

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Bellevue	186	10,790	1,610	140
Caddo	2,361	157,626	24,664	1,356
Catahoula Lake	145	161	1,839	4
Carterville	129	3,121	1,179	29
Converse	93	2,505	995	26
Cotton Valley	4,521	43,269	41,731	158
Elm Grove	101	3,631	1,069	39
Haynesville	5,473	80,521	53,479	384
Homer	1,063	73,006	9,994	321
Lake St. John	326	393	2,807	16
Little Creek	964	2,738	6,762	53
Lisbon	570	10,657	5,933	136
Nebo	3,554	7,641	25,359	145
Olla	3,688	13,462	31,538	169
Red River	307	57,405	3,895	91
Rodessa	3,391	79,204	19,496	346
Sligo	605	4,015	4,485	87
Sugar Creek	475	1,968	4,432	35
Summerville	118	364	836	10
Urania	693	26,584	7,416	199
Willow Lake	99	201	999	2
Zwolle	177	14,886	914	34
Miscellaneous	446	3,738	3,562	131
Total	30,239	604,249	261,241	3,921

ARKANSAS

	1943 prod.	Cumulative to Jan. 1, 1944	Estimated reserves Jan. 1, 1944	No. of wells
Atlanta	983	3,814	8,186	24
Buckner	662	4,056	5,944	29
Champagnolle	348	15,429	2,571	75
Dorcheat-Macedonia	1,610	3,867	27,133	37
El Dorado	322	49,052	3,548	180
El Dorado, East	191	9,802	1,998	69
Fouke	482	1,009	6,591	20
Garland City	86	2,158	742	9
Haynesville	202	203	3,797	8
Irma-Troy	555	10,151	4,349	116
Magnolia	6,005	30,712	119,288	115
McKamie	377	2,072	15,428	19
Midway	2,171	3,393	44,607	41
Mount Holly	217	468	3,532	13
New London	355	423	3,577	15
Rodessa	212	6,820	1,180	58
Schuler and East	5,520	38,022	51,978	174
Smackover	4,460	388,376	36,624	1,593
Stephens	1,609	9,015	12,985	268
Urbana	704	7,834	7,166	64
Village	437	2,007	3,993	13
Miscellaneous	238	8,616	2,184	183
Total	27,906	607,299	362,903	3,020

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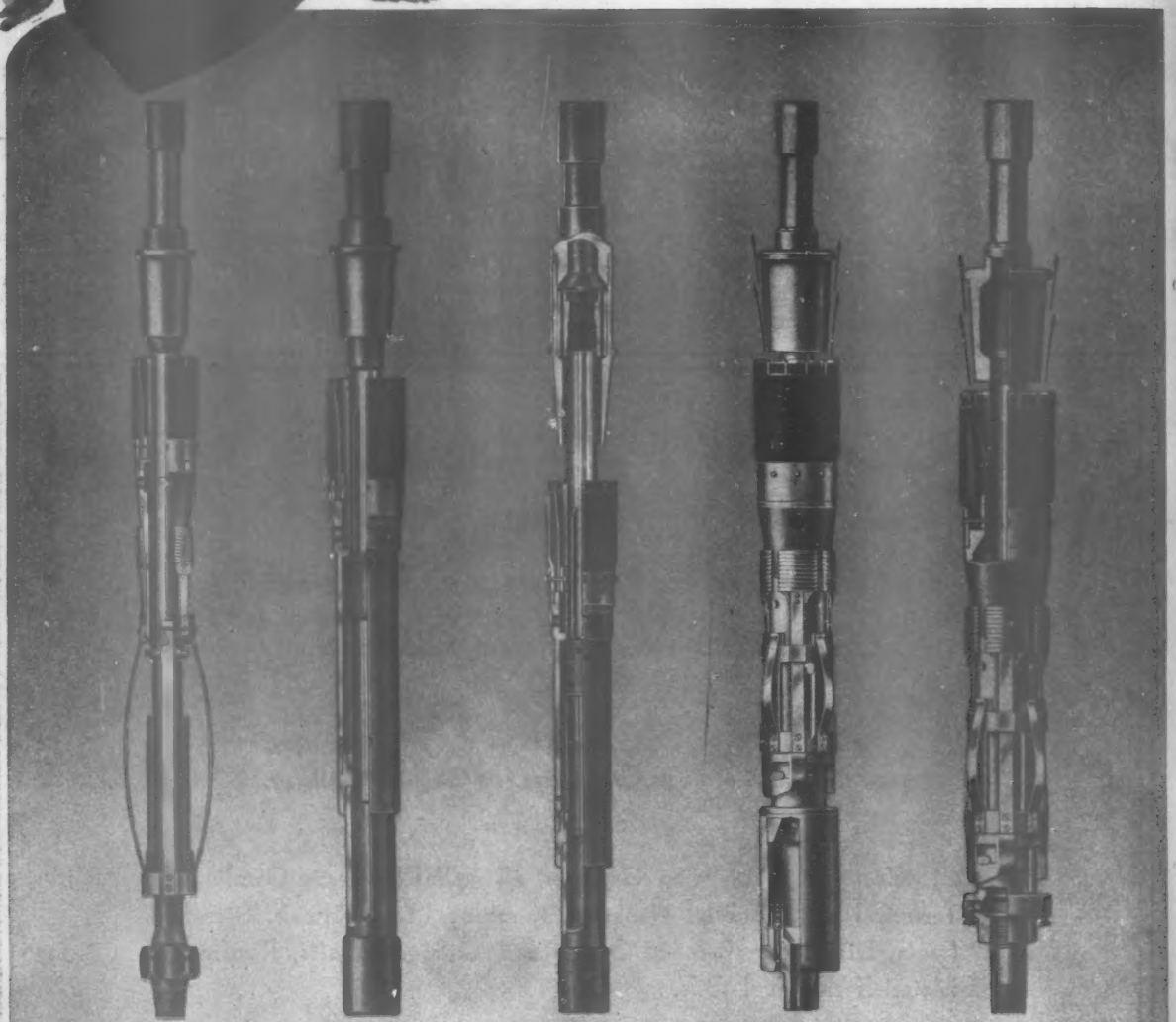

Type G Control Head Packer
Pat. No. 2,106,392

Type Z Bottom Hole Packer
Pat. Pend.

Type Y Criss-Cross Production Packer
Pat. Pend.

Type B Control Head Packer
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IF you have ever tried to run a packer in heavy fluids or under other extremely difficult conditions, you know that *no single packer* can be used efficiently and economically on every packer job today. The conditions encountered in wells in one field may differ entirely from the conditions faced in another—and your type of packer may have to differ with them.

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TYPE G CONTROL HEAD PACKER—Our engineers designed this packer for use in areas where heavy fluids and other extremely difficult packer conditions are encountered. See how it is designed with *no J-slot* which simplifies setting under all conditions. Our Type G Packer has been used extensively by major oil companies for over a year and its popularity is growing by leaps and bounds.

TYPE Z BOTTOM HOLE PACKER—Due to its extreme simplicity, this has become one of the most popular bottom hole, anchor-type packers in use today. It has *no slips, no springs, no gadgets* of any kind to foul or interfere with its efficient setting. Note *locking bar* on tube which permits the efficient use of *safety joint* above packer.

TYPE Y CRISS-CROSS PRODUCTION PACKER—To be used in dual completion installations in conjunction with Type Z Bottom Hole Packer to divert lower high pressure pay into the annulus and the upper low pressure pay into the tubing. There are a lot of engineering features you'll like about this packer. For instance, it is designed with a disk at the top of the packer that can be broken through, in case of emergency, to allow entry through the packer. What's more it has *full tubing size opening* through-out the length of the packer. Has same locking bar on tube as Type Z Packer.

TYPE B CONTROL HEAD PACKER—This packer rates high when it comes to extending the flowing life of weak wells that ordinarily would have to be pumped. The Type B surge or flow chamber can be furnished on our Type X Body as illustrated, or on our Type G No-J body.

TYPE X CONTROL HEAD PACKER—You can effectively meet *all* control head packer requirements with this Type X Packer. Can be used to prolong the natural flowing life of wells . . . for flowing weak wells . . . in conjunction with gas lift equipment . . . for washing formation casing perforations . . . for making water shut-off test of the casing shoe . . . for locating leaks . . . or in repressuring or acidizing.

NORTH LOUISIANA
Summary of Completions, 1943

Field—	Comp.	Oil	Prod.	Gas	Dry
Caddo	45	40	2,166	0	5
Calvin	4	1	24	0	3
Carterville, N.	6	6	770	0	0
Catahoula Lake	5	3	636	0	2
Cross Lake	2	1	48	0	1
Haynesville	24	22	4,435	0	2
Holly Ridge	2	2	653	0	0
Hosston	7	3	65	1	3
Lake St. John	7	5	553	0	2
Lisbon	3	0	0	2	1
Logansport	1	0	0	1	0
Manifest	2	0	0	0	2
Monroe	39	6	0	33	1
Nebo	8	6	916	0	2
Pine Island	10	9	531	0	1
Simsboro	2	1	50	1	0
Sligo	6	5	117	0	1
Sugar Creek	11	3	1,361	3	5
Urania	1	1	110	0	0
Vivian	3	0	0	0	3
Wildcats	86	7	744	6	73
Miscellaneous	39	11	560	7	21
Total	313	126	13,641	59	128
Total 1942	446	272	58,705	20	153

NORTH LOUISIANA
Wildcat Completions, 1943

Parish—	Comp.	Oil	Prod.	Gas	Dry
Bienville	3	0	0	2	1
Bossier	9	1	10	0	8
Caddo	6	2	30	0	4
Caldwell	4	0	0	1	3
East Carroll	2	0	0	0	2
Catahoula	3	0	0	0	3
Claiborne	5	0	0	0	5
Columbia	1	0	0	0	1
Concordia	5	2	211	0	3
De Soto	7	0	0	1	6
Franklin	1	0	0	0	1
Grant	3	0	0	0	3
Jackson	1	0	0	0	1
La Salle	3	1	105	0	2
Lincoln	1	0	0	0	1
Morehouse	4	0	0	0	4
Natchitoches	5	0	0	0	5
Ouachita	1	0	0	0	1
Rapides	1	0	0	0	1
Red River	7	0	0	2	5
Richland	1	0	0	0	1
Sabine	3	0	0	0	3
Tensas	3	1	388	0	2
Union	1	0	0	0	1
Webster	3	0	0	0	3
West Carroll	2	0	0	0	2
Winn	1	0	0	0	1
Total	86	7	744	6	73

NORTH LOUISIANA
Completions by Months

Month—	Comp.	Oil	Gas	Dry	Footage
January	21	11	2	8	96,849
February	23	10	1	12	92,818
March	23	9	1	13	93,044
April	24	9	3	12	120,144
May	20	6	5	9	84,637
June	31	11	3	17	108,027
July	33	15	6	12	121,108
August	24	8	10	6	88,355
September	18	5	8	5	49,601
October	32	8	6	18	121,208
November	34	17	9	8	111,517
December	30	17	5	8	111,967
Total	313	126	59	128	1,199,275

ARKANSAS
Wildcat Completions, 1943

County—	Comp.	Oil	Prod.	Gas	Dry
Ashley	1	0	0	0	1
Bradley	2	0	0	0	2
Calhoun	15	0	0	0	15
Chicot	1	0	0	0	1
Clark	2	0	0	0	2
Clay	1	0	0	0	1
Cleveland	3	0	0	0	3
Columbia	8	3	1,011	0	5
Desha	1	0	0	0	1
Franklin	1	0	0	1	0
Hempstead	1	0	0	0	1
Johnson	1	0	0	0	1
Lafayette	1	0	0	0	1
Little River	3	0	0	0	3
Miller	2	0	0	0	2
Nevada	7	1	306	0	6
Ouachita	9	0	0	0	9
Phillips	1	0	0	0	1
Scott	1	0	0	0	1
Union	9	1	238	0	8
Total	70	5	1,615	1	64

ARKANSAS
Summary of Completions, 1943

Field—	Comp.	Oil	Prod.	Gas	Dry
Atlanta	3	3	500	0	0
Buckner	1	1	215	0	0
Dorcheat	9	9	1,408	0	0
Fouke	11	9	2,139	0	2
Haynesville	7	6	1,004	0	1
Hillsboro	11	10	177	0	1
Macedonia	12	12	2,051	0	0
Midway	9	8	954	0	1
Mount Holly	7	7	684	0	0
New London	13	10	1,294	0	3
Nick Springs	1	1	35	0	0
Rainbow City	8	3	240	1	4
Stephens	66	48	5,936	0	18
Wildcats	70	5	1,615	1	64
Miscellaneous	15	5	345	1	9
Total	243	137	18,597	3	103
Total 1942	184	103	12,495	7	74

ARKANSAS
Completions by Months

Month—	Comp.	Oil	Gas	Dry	Footage
January	14	10	0	4	90,732
February	14	7	0	7	77,299
March	24	12	0	12	124,021
April	15	8	0	7	67,008
May	12	7	0	5	55,720
June	25	14	0	11	110,484
July	19	8	1	10	83,960
August	19	11	0	8	88,756
September	27	16	0	11	87,780
October	11	5	1	5	31,788
November	38	22	1	15	172,697
December	25	17	0	8	105,108
Total	243	137	3	103	1,095,373

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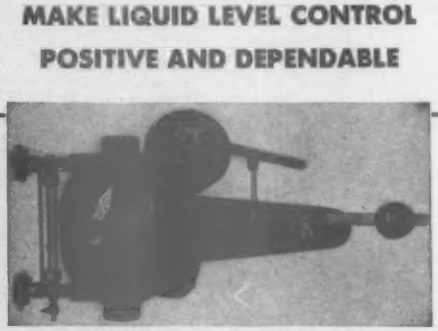

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Florida Discovery and Four New Mississippi Fields Draw Attention

DISCOVERY of first oil production in Florida and four additional new fields in Mississippi during 1943 gave further incentive for more intense and widespread leasing, exploration and development in the southeastern states. Although the individual discoveries did not appear to offer any immediate contribution to large production, they substantiated growing beliefs of many operators that southeastern states hold potentialities of developing major petroleum reserves.

The Florida discovery was Humble Oil & Refining Co. 1 Gulf Coast Realties Corp., at Sunniland, Collier County, in the Everglades district, south-central part of the state. The well completed on the pump has been producing 77.3 bbl. of 19-gravity oil daily with considerable water from a total depth of 11,626 ft.

Of the new fields opened in Mississippi, Eucutta, Wayne County, in the extreme western part of the southern portion of the state currently appears to be the most important reserve. The discovery well, Gulf Refining Co. 1 Aden Davis, was completed in October from the Tuscaloosa sand around 6,670 ft. It is estimated to have approximately 1,000 acres of production with a reserve of around 2,500,000 bbl., although so far the discovery well is the only producer.

California Co. discovered two of the fields, one on the Brookhaven dome, Lincoln County, and the other in the Cranfield area of Adams County. The former, in the south-central part of the state, is producing from Tuscaloosa at plug-back depth of 10,288 ft., and the latter, in the southwestern part of the state, produced the Wilcox at 5,880 ft. Cranfield has an estimated reserve on the basis of the one well of approximately 1,000,000 bbl.

The other new fields include one opened by Pure Oil Co. southwest of Natches, Adams County, and Flora, Madison County, in the north-central part of the state, northwest of the old Jackson gas field, opened by Flora Oil Co. The discovery well of each was small and constituted the only development in the respective fields. The former, now shut down, was completed in the Tuscaloosa at 10,440 ft., and the latter in the Woodruff at 4,367 ft.

At the close of the year, another new field was indicated by Gulf Refining Co.'s wildcat in Jasper County, in the east side of the state. This wildcat had substantial oil and gas showings with favorable tests in the Eutaw, first at 4,936 ft., and later in the base of the Eutaw. It has been carried deeper for an exploratory test and at present is coring below 5,986 ft.

Ohio Operators Center Work in Proven Fields

COLUMBUS, Ohio.—No new fields have been discovered in Ohio this year, but a number of promising pools within and extensions to existing fields have been found. The outstanding well completed this year was the Johnson well in Muskingum County, which opened the West Zanesville pool. It stands as the largest Clinton sand oil well ever completed in Ohio.

A number of additional wells have been completed in the pool, but none have come up to expectations, and most have been either gas or dry. Two gas pools and an oil pool were also discovered in the field, all of which are of unknown extent as they have not yet been developed. The South Wayne gas pool, an extension in the field, is being developed into a prolific producer, one well being the largest gas completion in the state this year.

The Clayton pool this year again accounted for the bulk of the initial production. The main pool is now defined and nearly drilled up. Extensions to the northeast have been found and are now being developed. A promising oil well was found southeast of the Brush Creek gas field, but as yet no offsets have been drilled. A new Pennsylvania grade pool was discovered in Perry County at the east end of the New Straitsville field. The pool is expected to have good recovery, but to be of limited extent.

A discovery well in what is probably one of the Warren sands, near Woodsfield in Monroe County, is being closely watched as it is the first producer in that sand in the state.

The Wellington-Pittsburgh gas field, discovered in 1942, has been developed and has produced more initial open flow than any other field in the state. A number of wildcats have

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been drilled but so far no extensions have been found. The Hinckley and Granger pools in Medina County have been extended.

The Ashland field with the second largest new initial open flow was highlighted by the Lakeville pool in Holmes and Wayne counties. The pool consistently produced above average wells and has no dry holes.

Completions by Months

Month—	Comp.	Oil	Gas	Dry	Footage
January	54	7	28	19	147,747
February	53	7	29	17	148,914
March	74	9	37	28	198,790
April	62	10	35	17	150,143
May	74	10	36	28	194,921
June	84	11	36	37	19[illegible],229
July	84	18	30	36	210,877
August	100	18	38	44	250,198
September	91	18	33	40	231,008
October	88	15	42	31	224,198
November	103	22	40	41	281,087
December	112	17	50	45	258,531
Total	979	162	434	383	2,492,632

Note — Recompletions — Oil, 4; gas, 13; dry, 6.

Twenty-Two Wildcats Hit Oil in Western Kentucky

OWENSBORO, Ky.—With field work more or less active in 20 counties of western Kentucky during 1943 about 22 wildcats found oil production but 122 of the outside tests were dry. The 22 successful tests were divided among new pools and what subsequently developed into pool extensions as operators followed with wells that joined wildcats to the main pool.

The most active areas during the year were Daviess, Henderson, and Union counties where rich production was found but where dry holes were numerous. Henderson County's crop of oil wells averaged 150 bbl. to the well in initial production. The dry hole average in Henderson County was about 35 per cent of all the wells drilled. Completions in Union County averaged better than 220 bbl. to the well initially.

WESTERN KENTUCKY
Completions by Months

Month—	Comp.	Oil	Gas	Dry	Footage
January	15	8	1	6	29,550
February	29	20	0	9	57,420
March	26	18	1	7	50,700
April	21	12	2	7	41,370
May	25	10	0	15	49,175
June	40	18	0	22	79,120
July	39	19	1	19	73,686
August	42	16	0	26	75,564
September	60	29	0	31	115,866
October	48	23	0	25	93,744
November	33	12	0	21	52,583
December	33	12	0	21	56,136
Total 1943	411	197	5	209	776,914

EASTERN KENTUCKY
Summary of Wells Completed in 1943

County—	Comp.	Oil	Prod.	Dry	Gas
Floyd	33	0	0	3	30
Martin	39	15	107	2	23
Pike	78	3	56	14	63
Knott	28	0	0	6	22
Magoffin	14	9	54	0	5
Johnson	9	2	5	0	7
Wolfe	7	0	0	4	3
Morgan	3	0	0	2	1
Knox	1	0	0	0	1
Menifee	10	9	120	0	1
Clay	3	0	0	0	3

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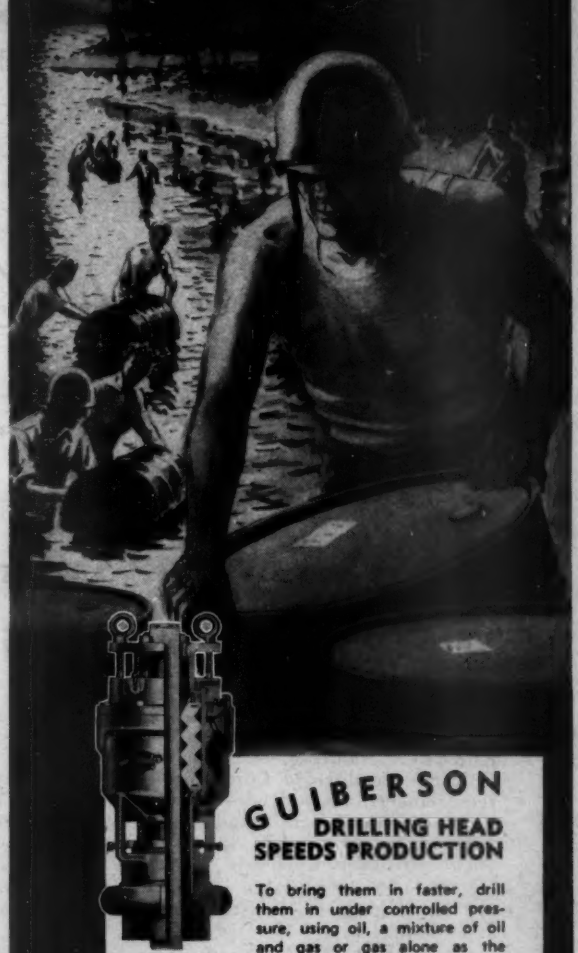

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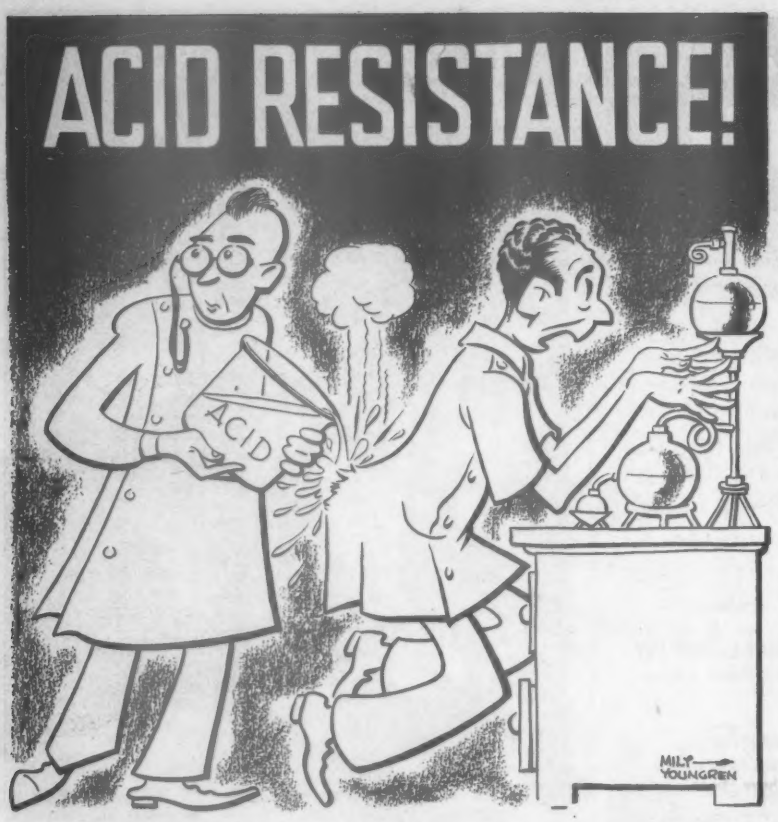

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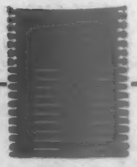

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Plants: Maywood and Elgin, Ill.

County—	Comp.	Oil	Prod.	Gas	Dry
Elliott	6	6	170	0	0
Greenup	1	1	2	0	0
Rowan	11	0	0	11	0
Jackson	2	2	60	0	0
Total	245	46	572	42	*157

*Combined initial reported daily open flow of above gas wells 83,124,000 cu. ft.

Three New Fields Compare Unfavorably in Indiana

EVANSVILLE, Ind.—Field work in Indiana during 1943 resulted in only three new pools, a poor record when compared to the 12 pool discoveries in 1942. Last year's new pools included North Owensville in Gibson County, producing from McClosky lime; Rogers in Posey County, a Clore sand pool, and Newtonville in Spencer County. Of these the North Owensville field opened early in the year was the most active in following up discovery wells with six producers.

The Newtonville field was opened in November by William B. Bateman, trustee, 1 John Ernst, C SE NW SW 8-6s-14w, a 10-bbl. well at a total depth of 802 ft.

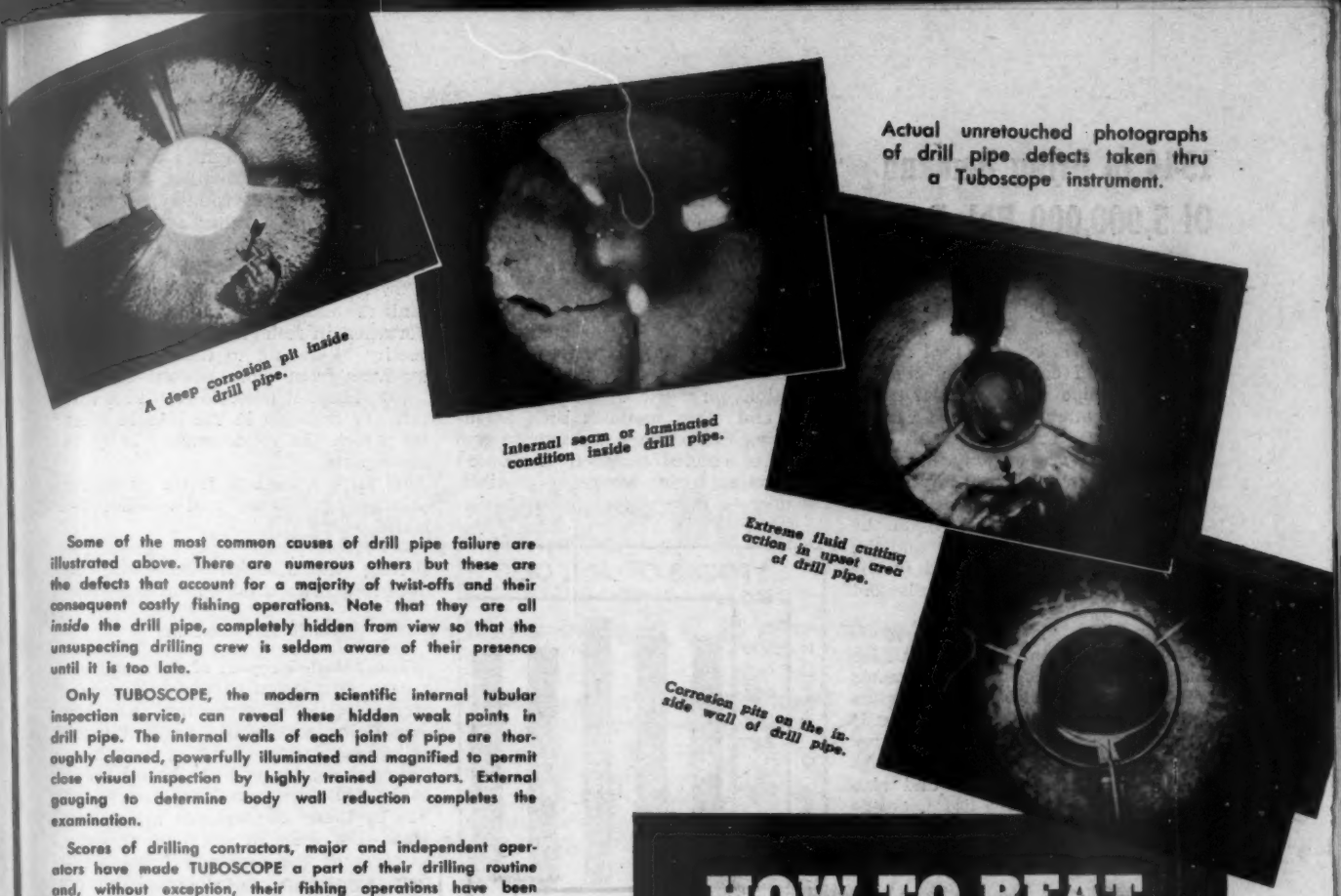
The Upton pool in Posey County was opened in December by Bennett Brothers Drilling Co. 1 John W. Spencer, C NE SE SW 32-6s-14w. It flowed 230 bbl. initially and then pumped 115 bbl. of oil and 20 bbl. of water from Tar Springs sand at 2,142-50 ft.

Completions by Months

County—	Comp.	Oil	Prod.	Gas	Dry
Clay	1	0	0	0	1
Daviess	10	2	3	1	7
Dearborn	2	0	0	0	2
Decatur	3	0	0	0	3
DuBois	2	0	0	0	2
Gibson	63	39	3,071	0	24
Harrison	5	0	0	2	3
Henry	2	0	0	2	0
Jay	8	5	92	1	2
Jennings	1	0	0	0	1
Knox	10	4	214	0	6
Lake	1	0	0	0	1
Madison	1	0	0	0	1
Pike	8	0	0	0	8
Posey	66	24	1,897	1	41
Randolph	3	1	2	0	2
Rush	2	0	0	1	1
Spencer	23	9	274	1	12
Sullivan	2	0	0	0	2
Vanderburgh	21	11	615	1	9
Warrick	4	1	2	0	3
Elkhart	1	0	0	0	1
Fountain	1	0	0	0	1
Jasper	1	0	0	1	0
Laporte	1	0	0	0	1
Marshall	1	0	0	0	1
Scott	1	0	0	0	1
Wayne	2	0	0	0	2
White	1	0	0	0	1
Total 1943	247	96	6,175	11	140

Completions by Months

Month—	Comp.	Oil	Gas	Dry	Footage
January	12	4	3	5	16,451
February	28	12	1	15	52,242
March	23	12	0	11	46,560
April	12	3	2	7	16,284
May	19	8	1	10	31,096
June	13	4	0	9	19,068
July	17	5	1	11	26,570
August	18	2	1	15	31,332
September	37	15	1	21	60,951
October	19	8	0	11	35,916
November	22	9	0	13	40,310
December	27	14	1	12	51,190
Total	247	96	11	140	427,972



Actual unretouched photographs of drill pipe defects taken thru a Tuboscope instrument.

A deep corrosion pit inside drill pipe.

Internal seam or laminated condition inside drill pipe.

Extreme fluid cutting action in upset area of drill pipe.

Corrosion pits on the inside wall of drill pipe.

HOW TO BEAT A TWIST-OFF TO THE DRAW

Some of the most common causes of drill pipe failure are illustrated above. There are numerous others but these are the defects that account for a majority of twist-offs and their consequent costly fishing operations. Note that they are all *inside* the drill pipe, completely hidden from view so that the unsuspecting drilling crew is seldom aware of their presence until it is too late.

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1944 to Bring Demand Of 5,000,000 Bbl. Daily

(Continued from page 128)

of fuel oils will be less than it was in 1943 and 1942.

Little stress is being placed on the substitution of coal for fuel oils because, with pipe-line and water transportation available, fuel oils can be delivered to consumers with less strain on a war economy than can coal. The industrial consumption of residual fuel oils will increase in some areas in 1944. The full effect of the large expansion of the Navy and the Merchant Marine is reflected in the projected demands for fuel oils and diesel oils in 1944.

The analyses that have been made of all the kerosene demands under war conditions and those of tractor fuels, range oils and other less important products would be of interest if they could be made public. They reveal that there are no adequate substitutes for these products and also that their increased use is an essential part of a war economy.

PIWC Report

The question is often asked as to why larger percentages of the 1944 demands are not supplied from sources outside this country. The PIWC committee on petroleum economics answered this question in its latest report when it explained that the 1944 requirements in this country, as summarized in the accompanying table, took into consideration all the petroleum supplies that will be available from other countries. The PIWC report regarding 1944 petroleum requirements explained:

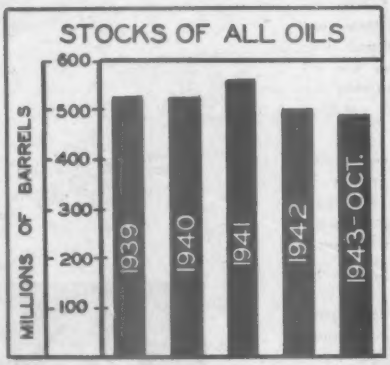
The amount necessary to balance United Nations requirements will doubtless be sought from all world sources on the basis of further restrictions on world civilian consumption and other methods such as increasing the refinery throughput and yield of refined products in United Nations countries wherever possible. Thanks to more effective utilization of all United Nations sources and new high levels of domestic production, the situation appears comfortable during the first 6 months but becomes increasingly serious toward the end of the year and emphasizes the necessity of increasing exploration, development and secondary recovery activities to increase domestic crude production. Increased production in this country, as compared with most other areas, would be particularly desirable in that it would:

(a) Decrease the burden on both tankers and other forms of transportation in relieving the present necessity of having to take crude and products from more distant sources.

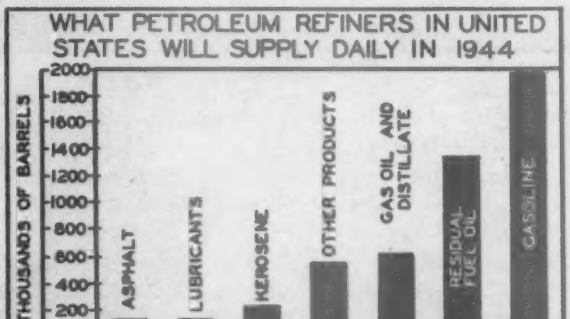
(b) Make it possible to utilize idle refinery capacity in the Middle West for which the crude supply is quite inadequate.

(c) Give a desired factor of safety in meeting military and civilian demand, and,

(d) Avoid possibly more severe rationing which might otherwise be necessary toward the end of this year.



(Barrels)	
October 1943	486,697,000
1942	497,940,000
1941	556,425,000
1940	525,838,000
1939	525,888,000



Basic Assumptions

The detailed report of the subcommittee, circulation of which is necessarily restricted, gives the basic assumptions, particularly as to the use of transportation facilities, on which the final results set forth herein were calculated. In general, the uncertainties in these assumptions are somewhat less than in previous reports, as most of the overland transportation facilities are now completed or substantially so.

The present transportation situation is tighter than anticipated due to a combination of three principal factors, as follows:

(a) Less efficient use of tank cars, apparently due to some relaxation of effort on the part of both the industry and the railroads as compared with the previous performance. The matter should have the attention of the industry executives.

(b) A tightening of the tanker situation due to various factors, some of which will be looked into during the coming month.

(c) Delay in the completion of the 20-in. line due to prolonged water tests made necessary by numerous failures in certain welded pipe.

Stocks

The accompanying table gives total stocks of all oils as of October 31, 1943, which is the latest Bureau of Mines report. Over the past 2 months of 1943 the crude-oil inventory situation improved and stocks of crude oil at the start of the year according to government data were 7 million barrels greater than on January 1, 1943. In regard to refinery products, the decreases in stocks at the start of the year were: Gasoline, 4,170,000 bbl.; residual fuel oil, 15,342,000 bbl.; gas oil and distillate, 2,402,000 bbl. These reports indicate that when official data are available they will show that stocks of all oils at the close of 1943 were the lowest for that corresponding date in 20 years.

ANTICIPATED QUANTITIES OF PETROLEUM PRODUCTS AVAILABLE FROM THE UNITED STATES DURING 1944 BY QUARTERS
(Barrels per day)

Product—	First quarter	Second quarter	Third quarter	Fourth quarter	Year
Gasoline	1,841,000	2,064,000	2,063,000	1,943,000	1,978,000
Kerosene	267,000	207,000	162,000	256,000	223,000
Gas oil and distillate fuel	771,000	577,000	510,000	710,000	642,000
Residual fuel	1,430,000	1,254,000	1,270,000	1,417,000	1,341,000
Lubricants	128,000	129,000	127,000	124,000	127,000
Asphalt	71,000	126,000	168,000	111,000	119,000
Other products, crude and refinery loss	518,000	568,000	583,000	563,000	557,000
Total products, crude, other raw materials	5,026,000	4,925,000	4,883,000	5,124,000	4,987,000

Long-Range Forecast of Motor-Gasoline Development

by D. P. Barnard and R. F. Marschner*

This article is a slightly abbreviated version of a paper presented at last week's meeting in Detroit of the Society of Automotive Engineers. In their introduction, which is omitted, the authors alluded to the widespread public impression that after the war, 100-octane motor gasoline may be widely available. The authors believe that no such improvement is in the cards, and in their article they indicate the problems which must be solved before motor gasolines approaching 100-octane number can be generally available.

WHILE it may not be universally appreciated, the basic premise for the manufacture of motor gasoline has been, for at least 25 years, that the gasoline quality must be such as to make possible the greatest number of car miles per barrel of crude compatible with acceptable and reasonable performance standards. This was the first problem assigned to the C.F.R. at the time of its formation in 1921 and is still a major concern of that committee as a division of the Coordinating Research Council. Because of the very large part played by crude costs in the cost of gasoline, the petroleum industry has never been able to stray very far from this fundamental premise, although relatively modest deviations have been permitted in the past when crude has been cheap and available in unrestricted quantities. Even under such circumstances, however, the basic economics of refining have prohibited extravagances in crude consumption in the interest of gasoline-quality improvements. By and large, such quality improvements have been effected concurrently with improvements in yield from crude, or, at the worst, at no significant loss in crude.

Motor gasoline may be considered as consisting of two groups of components; those which are highly desirable from the point of view of present ideas concerning knock tendency and volatility requirements and those relatively undesirable components which we seek to change into more desirable ones. An obvious and simple method for accomplishing this might consist in employing a "Maxwell Demon" or some appropriate gremlin to "sort" out the desirable components and relegate to byproducts status the undesirable ones. But such a sorting procedure alone would not comply with the requirements for efficient crude utilization. Further, the highest-octane-number hydrocarbons such as isooctane simply do not occur naturally to any appreciable extent. Basically, therefore, solutions must be found to the problems of converting undesirable hydrocarbons into desirable ones and for the conversion of other hydrocarbons, not initially within the gasoline range, into desirable ones.

*Research department, Standard Oil Co. (Indiana).

The Octane-Number Problem

The problem of further motor-fuel improvement is basically a problem in chemistry. Therefore, it is necessary to consider the behavior, as chemicals, of the individual components of gasoline. There are 5,930 possible hydrocarbons in the gasoline boiling-point range. As there are so many of these chemical components, and as practical experience has shown their reactions to be extremely complicated, research into the fundamental properties of gasoline hydrocarbons has become a cooperative effort of the petroleum industry.

Currently, the research on gasoline hydrocarbons consists of several separate, but closely coordinated projects. A.P.I. Project 6 is engaged in the determination of the hydrocarbons present in gasolines and in their purification and determination of physical properties. A.P.I. Project 44 is critically appraising and correlating the data on the physical properties of gasoline hydrocarbons. The A.P.I. Hydrocarbon Research Project is now in the sixth year of its program for preparing individual gasoline-range hydrocarbons in quantities sufficient for engine testing as well as physical and thermal property determination. While this work is far from complete, it is ahead of early expectations and has produced data which can be used in appraising the relations between hydrocarbon structure and knocking tendencies. The following discussion has been based largely on the results of these projects.

It is generally recognized that the gasoline range hydrocarbons fall in four principal chemical categories: Paraffins, cycloparaffins (or naphthenes), olefins and aromatics. Because of the very significant differences in the chemistry of these different classes they will be treated separately in the following discussion.

A. Paraffin hydrocarbons. — The paraffin hydrocarbons are, by definition, those in which the carbon atoms are "saturated" with the maximum possible number of hydrogen atoms. They may be considered as either straight or branched chains of carbon atoms to which a hydrogen is attached to every carbon bond not otherwise used as a link to another carbon atom. Those paraffins in which the carbon-to-carbon linkage is a continuous chain are know as "normal" paraffins, while those involving branching of the carbon chain are denoted "iso" paraffins. An important characteristic of all paraffins, and one which results directly from the

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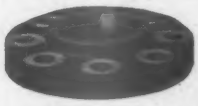

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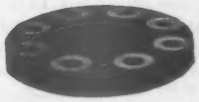

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fact that they are completely saturated with the greatest possible number of hydrogen atoms, is that they have the highest calorific value of any of the hydrocarbons (about 19,000 B.t.u. per lb., net). Light paraffins contain relatively more hydrogen than the less volatile ones.

The total number of paraffins in the motor gasoline range is 650. This number includes a few common straight-chain components such as n-heptane having by definition an octane number of zero, and many less-common highly branched hydrocarbons such as 2,2,4-trimethylpentane which is familiar to all as reference isooctane and which has, by definition, an octane number of 100. In between these extremes are the moderately branched paraffins of intermediate octane number. It is a general rule that the higher the degree of branching the higher will be the octane number. For example, there are 18 octanes; of these there are 4 trimethylpentanes (in which 3 side methyl groups are attached to a 5-carbon main chain) which have unleaded A.S.T.M. octane numbers between 95 and 100. All but one of the other octanes have octane numbers more or less progressively decreasing with the degree of branching. The most highly branched hydrocarbon in the series—variously known as tetramethylbutane, hexamethylethane, or as the "solid octane"—may be considered as having a main chain of only four carbon atoms with four side methyl groups. Its sobriquet of "solid octane" comes from the fact its melting point is 216° F. This octane is strictly a scientific curiosity as far as the present discussion is concerned.

The octane-number problem can be exemplified by the octane series. A mixture of approximately equal amounts of all 18 octanes, with the aid of, say, 1 cc. of lead, would have an A.S.T.M. octane number of 82. A similar mixture of the 11 most highly branched octanes would give 100 octane number with 1 cc. of lead, but the 7 which would have to be left out unfortunately include all 4 which occur in any appreciable amount in petroleum, and a mixture of these 4 with 1 cc. of lead would have only 38 octane number.

From correlations based upon knock data secured by the A.P.I. Hydrocarbon Research Project it is possible to estimate with considerable confidence the octane numbers of paraffins from their chemical structure. For example, it can be predicted that a mixture of all 159 11-carbon paraffins, the undecanes, would have 74 A.S.T.M. octane number with 1 cc. of lead. The 84 most highly branched of the undecanes, or the best 53 per cent of them, if mixed together in equal amounts, would give 100 octane number with 1 cc. of lead. The difficulty is that not one of these 84 more highly branched 11-carbon pariffins has yet been seen in pure form. A mixture of the handful of undecanes which have so far been found or made, would have an octane number of only 13 with 1 cc. of lead. It is evident that quantity production of 100-octane-number gasoline among the undecanes (probably best suited to the requirements of a "high-flash" aviation fuel) is still two long steps from reality. Before commercially practical methods of production can be devised, means for synthesizing even small quantities in the laboratory must first be developed.

If we distill a completely paraffinic motor gasoline containing equal amounts of total pentanes, hexanes, heptanes, octanes, etc., up to about 12 carbon atoms, into three approximately equal parts; light, intermediate and heavy, and add 1 cc. of lead to each, we would find that if all possible paraffins are present (in equal amounts within each group) the A.S.T.M. octane numbers would be 88, 81 and 75. But if only those paraffins which are already known are present, the octane numbers would be 88, 78 and 30. And if the paraffins are present in the ratios in which they occur naturally, the values would be 68, 24 and below 0. These comparisons illustrate that especially in the heavy third of motor gasoline, twin problems must be solved to produce a 100-octane-number motor fuel; not only is it necessary to prepare the high-octane-number paraffins, but it is equally important to eliminate the low-octane-number ones. Suppose that after a great deal of research, a process for rearranging paraffins throughout the gasoline boiling range were developed. From experimental and thermodynamic data, and with considerable extrapolation, the composition of the resulting mixtures of all possible paraffins can be estimated for such an ideal process, operated at, say, 300° F. The light cut would have 87, the intermediate cut about 85, and the heavy cut not far from the same leaded octane number. Even such an ideal process as this fails to give 100-octane-number motor gasoline.

From the foregoing, it appears that in order to achieve much higher goals as far as the paraffins are concerned, not only must methods be found for converting a considerable number of the more undesirable isomers into more highly branched and therefore more desirable forms, but also improved volatility, i.e., lower 90 per cent point, becomes a significant part of the problem, and means for converting, say, 11-carbon paraffins into those of 6 to 8 carbons would contribute considerably to bringing closer the day of quantity production of 90-octane paraffinic motor gasoline.

B. Naphthene hydrocarbons. — The hydrocarbons next to the paraffins in abundance are the naphthenes. For reasons which do not require elaboration here, it is unlikely that more than two of many possible kinds, the cyclopentanes and the cyclohexanes, need be considered as candidates for the type of gasoline being discussed. As indicated by the prefix "cyclo-", the naphthenes are characterized by a ring configuration, and as a result, they contain two less hydrogens than paraffins of the same number of carbon atoms. They are lower in calorific value by about 3 per cent and their lead susceptibility as a class is poor relative to that of the paraffins.

Since there obviously cannot be a cyclopentane with less than five carbons or a cyclohexane with less than six, naphthenes are of relatively more importance in the intermediate and heavy thirds of motor gasoline than in the light third. Of the 1,350 naphthenes in the gasoline range, only 8, with an average A.S.T.M. octane number of 85 with 1 cc. of lead, are of light gasoline volatility. Because of the paucity of knock data, little can be said of the heavy gasoline naphthenes beyond the fact that they range from below zero to above 90 octane number with 1 cc. of lead, but, in the intermediate range, correlations (again based largely upon data secured by the A.P.I. Hydrocarbon Research Project) have outlined the potentialities involved. A mixture of not more than 13 per cent of the possible intermediate naphthenes is likely to have 100 A.S.T.M. octane number with 1 cc. of lead, and none of these is as yet known. Those which are known have, in a mixture of equal quantities, 75 octane number with 1 cc. of lead, and those which have been knock rated average 71 octane number with 1 cc. of lead.

Thus there is a definite possibility for securing a limited amount of 100-octane-number gasoline from naphthenic hydrocarbons. The probability of doing so in the near future is considerably less than in the case of the paraffinic hydrocarbons. The principal reason for this is that isomerization reactions among the naphthenes cannot have the potential octane number increase possibilities characteristic of the paraffins.

C. Olefin hydrocarbons.— The olefin hydrocarbons, like the naphthenes, contain less hydrogen than the paraffins, and as a result calorific value and the lead susceptibility are appreciably less, the calorific values being about 2 per cent below the paraffins. Although there are considerable data upon the octane numbers of individual olefins, the detailed effects of structure upon knocking are not yet at all clear. Part of the reason for this is that there are

3,850 olefins which can be considered gasoline. Therefore, it is not possible to predict with certainty the octane numbers of all the members of an entire group of largely untested olefins such as the octenes. The average octane number of tested olefins in a gasoline made up, as in the discussion of paraffins, of equal amounts of pentenes, hexenes, heptenes, octenes, etc., would be 82 A.T.S.M. with 1 cc. of lead in the light third of the gasoline, 81 with 1 cc. of lead in the intermediate third, and the heavy third, for which few data are available, would be about the same. Complex mixtures of olefins known to have highly branched structures have octane numbers similar to those of the fractions of this hypothetical motor gasoline. Olefins certainly show smaller variations in octane number with structure changes than do paraffins. For example, the authors know of no data showing an olefin with less than 40 A.S.T.M. octane number with 1 cc. of lead but, on the other hand, to their knowledge no olefin tested has had an octane number above 93 with 1 cc. of lead. Moreover, lead has little effect on those olefins with clear octane numbers above 80. It seems clear that it will never be possible to produce motor gasoline of 100 A.S.T.M. octane number in quantity from olefins alone.

D. Aromatic hydrocarbons. — The uniformly high clear octane numbers of aromatic hydrocarbons are partly offset by the low calorific value (about 8-9 per cent below the paraffins) and poor lead response, both accompanying the low hydrogen content. Since the simplest aromatic hydrocarbon has six carbon atoms and because they are less volatile than other hydrocarbons of the same carbon content, the aromatics, like the naphthenes, are relatively more important in the intermediate and heavy fractions than in the light fraction of a motor gasoline. A mixture of all 80 possible motor-fuel aromatics would be not quite 100 A.S.T.M. octane number with 1 cc. of lead; this holds true in both the intermediate and heavy thirds of the motor-fuel range. About a third of them should exceed 100 octane number, and not more than one or two are below 90 The importance of aromatics in increasing the octane numbers of olefinic gasolines, for example, is obvious.

Although the aromatic hydrocarbons are common chemicals, they are not abundant from the motor-fuel standpoint. The average aromatic content of typical prewar gasolines was not greater than 11 per cent, a value similar to that recently obtained by A.P.I. Project 6 for the average aromatic content of a variety of straight-run gasolines. Methods both old and new, for producing aromatic hydrocarbons from hydrocarbons of other classes, are well known, and postwar gasolines will probably contain a little more aromatics than prewar fuels. But these methods have so far been most useful for the preparation of specialties such as toluene and high solvency naphthas. Perhaps the best known of these methods involves the "dehydrogenation" of a part of the naphthenes present in a naphtha and, as was pointed out previously, the naphthenes as an entire group are themselves not the most abundant hydrocarbons. Project 6 data and other analyses show that the aromatic content of typical naphthenes can be doubled or tripled by such a dehydrogenation process. But the octane-number gain is obtained only at a substantial cost in material; the removal of hydrogen from a naphthene involves a minimum loss in weight which can easily be calculated; for the intermediate gasoline range this minimum loss is more than 5 per cent and in practice it is considerably greater. It is now possible to produce aromatic hydrocarbons from paraffins; the octane number benefits are greater than for naphthenes, but so also is the cost in lost hydrogen.

E. Recapitulation.—Paraffins, naphthenes, olefins and aromatics are the hydrocarbons which have long been available in what might be termed motor-fuel volumes. Other classes also have been examined as possible fuel components, some of these are familiar chemicals, some are rare, while others which might be expected to show high octane numbers, exist only on paper. But none of these need yet be considered as important motor-gasoline hydrocarbns.

The foregoing discussion has considered each class of hydrocarbon separately whereas the motor gasoline of the future, like the motor gasoline of the past, will be mixtures of all the four classes mentioned. Whether the octane number of such a mixture of hydrocarbons of different classes can be exactly calculated from the octane numbers of the individual hydrocarbons may be subject to debate, but the incremental octane number increases which might be anticipated in each of the classes may be combined with assurance that the weighted average is subject to little numerical error. From the estimated extent to which one to two decades of fuel research and development can utilize the maximum improvements which can be made in the various classes of hydrocarbons, it is believed that the motor fuel of 1960 may possibly exceed 88 A.S.T.M. octane number but probably will not reach 92 A.S.T.M. octane number.

The Volatility Problem

It is generally recognized that a "desirable" motor gasoline, in addition to having a high octane number, is appreciably more volatile than that defined by the federal specifications. These specifications define the "heavy end" of the gasoline fraction by an "end point" of 437° F. Gasolines made to this limit are generally unacceptable and, to no small extent, give such inefficient performance in service as to offset a large portion of their crude yield advantages. By and large, gasolines have been made to end points of 400° F. or less for such a considerable length of time that the federal specification limit has largely lost its significance.

The gasoline volatility problem reduces in the main to the separate tasks of keeping vapor pressures down (and, therefore, front end boiling points up) and 90 per cent and end points down and at the same time avoiding undue loss in yields from crude. In other words, performance requirements ask for relative narrow boiling point ranges while conservation of crude demands that gasoline fractions not be discarded unless the resulting gains in car mileage offset the losses in yield. By and large, therefore, improving volatility—like improving knock rating—must depend on the development of economically justifiable processes for converting the less desirable hydrocarbons into those falling within the desired volatility range.

The nature of this problem can be more forcefully emphasized by comparison with the foregoing discussion of the octane-number problem. Dropping the 90 per cent distillation temperature has the direct effect of reducing the number of hydrocarbons remaining in the boiling point range of the gasoline. Further, this effect is very pronounced. For example, of the 5,930 hydrocarbons possible within the 400° end point limit (corresponding to a 90 per cent point of, say, 356° F.) only 7 per cent remain if the end point be reduced to 300° F. and only 3 per cent if it be dropped to 250° F. It is obvious, therefore that volatility improvements can be achieved only if methods can be devised for converting the large hydrocarbon molecules having the higher boiling points into smaller molecules of desired boiling points without loss of the material removed from the larger molecules and without incurring unjustifiable costs.

Economic Requirements of Motor Gasoline Manufacturing Processes

Very briefly, the fundamental economic requirements of processes for improving the quality of a motor fuel can be defined as follows:

First, a process for converting, say, low-octane-number normal paraffins into high-octane-number branched paraffins, or high-boiling-point material into more volatile components,

must be one which will use "poor" gasoline as a raw material and must convert it into a "good" gasoline without destroying more than an inconsequential fraction. In other words, it must possess the characteristics of a true isomerization process or its equivalent and must merely revise the construction of the hydrocarbons in question without the rejection of significant quantities of material.

Second, processes must be evolved which will convert low-grade hydrocarbons (those not in the gasoline range) to gasoline hydrocarbons of the desired octane number and volatility.

Third, processes must not cause the loss of a significant amount of hydrogen. The advantages of petroleum and its products over coal, which is chiefly carbon, result from the fact that it contains "fixed" hydrogen with its relatively high calorific value. To lose hydrogen in a process is to waste crude from an energy standpoint. It is just as serious from the point of view of conservation as if the crude itself were to be destroyed. Just how valuable a resource is being destroyed when hydrogen is lost in a process is readily appreciated by anyone who has had to produce and deliver hydrogen. The "fixed" hydrogen in petroleum also imparts to the otherwise untractable carbon its desirable properties of fluidity, volatility, etc., and, in the case of gasoline, even provides those properties which make it susceptible to octane number improvement through the use of tetraethyl lead. However, the important point to remember is that hydrogen has a calorific value of about 52,000 B.t.u. per lb. as compared with 12,000 for carbon. Conservation and economics are directly against any process which involves its waste. And, lest the writers seem to overemphasize the matter of conservation, it should be remembered that during its lifetime the average car consumes over 10 times its weight in fuel.

Fourth, any process, in addition to being efficient from a crude standpoint, must also be operable, its cost being supported by the value of the improvements effected. For example, the various isomerization processes meet the crude conservation requirements completely. However, as they represent a procedure for making "gasoline out of gasoline" (albeit the product is of improved quality) it is very obvious that all of the costs of the operation must be borne by the value of the octane-number improvement. Isomerization cannot be afforded unless the cost of the operation can be included in the price of the product. In general, procedures for "making better gasoline out of poor gasoline" will probably be applicable to a relatively small extent and to the most undesirable group of the gasoline range hydrocarbons.

Another factor should be given very careful consideration when discussing octane-number improvements, particularly in the present range of interest. This is the well-known characteristic of the octane number scale in which, as the numbers become larger, each unit becomes more and more significant. For example, for the interval 69 to 70 octane number, one unit improvement may be considered as permitting an increase of 0.5 per cent in thermal efficiency of the appropriate engine. In the range 79 to 80 octane number the value of one unit in the proceeding terms becomes 1.25 per cent in thermal efficiency, while the change from 99 to 100 octane number is accompanied by a potential increase of 3 per cent in thermal efficiency. Obviously, these fuel improvements can be used in many ways such as, for example, in permitting supercharging, increases in compression ratio, etc. Discussion of this part of the subject is not within the province of this paper. However, the fact should be borne very clearly in mind that all studies of gasoline improvement, particularly in any attempt to formulate opinions as to the probable rate of improvement, indicate that, (a) it is characteristic of the octane number scale that the importance of an individual unit increases as we proceed up the scale, and (b) it is characteristic of the basic chemistry of fuel manufacture that each octane number becomes progressively more difficult to produce. Further, from here on it is reasonable to expect that improvements in octane number must bear an increasing amount of security from the standpoint of cost versus usefulness. An example of the importance of this factor is the utilization of grade 91 by the airlines in the prewar period in spite of the fact that 100 octane number fuel was readily available. It is a cold fact that even in commercial aviation, octane-number improvement can stand but a comparatively small premium—with the exception of exceptionally long-range operations. Because motor-car operation will be even more rigorously subject to the same economic laws as short-range air transport, we can only expect that octane-number improvements, while being hard to get, must be produced at very low costs. Therefore, an informal prognosis of the rate of gasoline improvement, over such a period as that up to and including 1,960, must lead to the conclusion that octane numbers will increase but at a progressively slower rate than in past. The present writers will be greatly surprised to see 100-octane-number A.S.T.M. motor gasoline generally available by as early as 1960. As a matter of fact, even 90 octane number appears very far in the future.

Conclusion

Certain conclusions as to the probable trends in motor-gasoline improvement follow from the various recent studies of the subject. Brown and Barnard pointed out that conversion of the available aviation-gasoline manufacturing facilities to motor-gasoline production might result in octane-number improvements of from two to three units in the early postwar period. The discussions of Chayne and Roenach emphasized the fact that the improvement of automobile-fuel mileage must be worked out step by step and that considerable time must elapse before acceptable high-compression engines can be evolved. Colwell's masterly survey of technical opinion further emphasized the "evolutionary rather than revolutionary" nature of fuel and car improvements. James has shown that the limits (theoretical and practical) beyond which fuel mileage simply cannot be pushed, are closer to present practice than the fantastic values which have been so blithely bandied about of late. The present discussion points out that the possibility of further improvements in octane number or volatility depend on (a) the development of processes which will convert non-gasoline hydrocarbons into gasoline hydrocarbons of the most desirable type without significant material loss, and (b) the general use of power plants which will realize sufficient benefit from the improved fuels to justify the increased costs of those processes which convert undesirable gasoline hydrocarbons into more desirable ones. Any effort to "force" octane numbers beyond these limits could easily result in crude wastage of as much as 9,000,000 bbl. per year per octane number gained. As the economics of gasoline production are identical with crude conservation such operations will probably not occur to any great extent.

If 100-octane number (A.S.T.M.) motor gasoline is ever to be generally available, means must be found for transforming about half of the gasoline-range hydrocarbons into others more desirable from the standpoint of octane number and volatility. The basic economics of gasoline manufacture are identical with those of conservation and, therefore, such processes must operate without appreciable material loss as well as at acceptable costs. The authors' guess is that motor-gasoline octane numbers will not get much above 90 (A.S.T.M.) by 1960. In any event, it seems fairly well assured that in spite of possible reductions in crude supply and the many other problems facing the petroleum industry, adequate quantities of gasoline of high quality will be available and that quality improvements will continue to keep ahead of the demands of car design.

Applied Waterflooding Experiments in Illinois

by Paul Reed

Expansion of air-repressuring operations and experiments in water flooding are now encouraged in stripper fields of Illinois by the present supply situation of the oil industry. The status of recent experiments there to advance the technique of systematic water flooding is discussed with mention of results obtained in small, scattered operations with applied, natural and accidental floods.

SEVERAL experiments now being conducted with modern procedures for systematic water flooding in Illinois may result in the development of practices specially adapted to conditions in the old fields of the state. These projects differ from other applied flooding operations of the area in the extent to which provision is made for efficient injection and in the scale on which they are conducted. Because of these features, such undertakings represent attempts to advance what is referred to as applied flooding in contrast with natural and accidental flooding. Previous to the systematic flooding experiments of the last year or so, applied flooding had been carried on in small scattered tracts for 10 years; significant effects of natural and accidental floods in Illinois have been observed for more than 30 years.

The first of the experiments of any extent in systematic water flooding are two projects undertaken together by an operator in the neighboring Siggins and Parker pools.

The Siggins pool in Cumberland County, opened in 1905, has a good production history for three sands. Flooding was applied only to the upper two sands, separated from the lower by shale. Sands flooded in a 40-acre project are at depths of 350-400 ft. Two rotary cores were taken on the 40-acre tract; the operator took about 40 cores in the general area preliminary to planning the flooding program.

All old wells on the 40 acres were plugged and input and producing wells were drilled on a five-spot pattern with 330-ft. spacing for 25 input wells and 16 producing wells.

The same procedure was used for completing both input and producing wells: 8-in. surface casing was set; 6¼-in. pipe needed in drilling certain wells was pulled at completion; after shooting and cleaning out, 1½-in. tubing with packer was set and cemented.

Fresh water for flooding comes from two gravel beds 6-10 ft. thick at depths of 60 ft. and 80 ft. in glacial drift. Brine produced with the oil has been pumped back into the sand. Water is pumped through a closed system with no filtering or treating.

Injection well installation at project in Cumberland County, Illinois

Injection pressures were cut back from 300 lb. to 280 lb. after excessive bypassing of water through the upper sand which required corrective measures shortly after oil was produced by flowing early in 1943.

In an effort to stop bypassing, a mixture of drilling mud and fiber was pumped into the input wells. It was common practice to use about 8 bbl. of mixture per well in handling as many as three wells per day with portable mixing and pumping equipment. Pressures for injecting the mixtures went from 300 lb. up to 600 lb. or 800 lb. Fiber was added in increasing amounts as the pressure was raised and in lesser amount toward the end of the operation which was finished with a high proportion of drilling mud. In spite of careful application of this procedure which has been effectively used elsewhere, bypassing continued.

Before commencement of water flooding only 22 bbl. per week were produced from the 120 acres in which the 40-acre project was located. At the end of the first quarter of 1943, production was 30 bbl. daily for the 40-acre project; daily average for the first 11 months of 1943 was 39 bbl.

Delayed Flood

At the Parker project in Clark County, a few miles northeast of the Siggins project, procedures followed were somewhat different from those just described. Before flooding, all of the wells had been abandoned for several years. The 660-ft. five-spot spacing pattern has nine input and four water wells on 40 acres. The oil sand being flooded is at about the same depth as the horizon flooded in the Siggins pool. The Siggins and Parker pools are two separate sand bodies with an intervening syncline.

Water has been injected into the Parker tract for more than a year but producing wells had not been opened at the end of 1943. Injection of water

Portable equipment for injecting mixtures of drilling mud and fibre into injection well where there was excessive bypassing through highly permeable sand strata

is handled in the same way as for the Siggins project.

In a field in the vicinity of the Hancock-McDonough County boundary, where repressuring with air since 1934 has been successful, 40 acres have been set aside for a flooding experiment. The producing horizon is the Hoing sand, 15 ft. thick at a depth of 500 ft. Some difficulty has been encountered with thief sections with permeabilities as high as 1,200 to 2,000 md. Ten old producing wells located one to 4.4 acres are retained as producing wells.

Nine new input wells were drilled into which water was first injected January 29, 1943. Input wells were drilled with a spacing of 440 ft. from input-to-input well and 300 ft. from water well to oil well. Water goes to the sand by gravity without pressure being applied at the surface of the ground. Heads of water on the sand vary from 88 to 150 ft.

During the first 10 months of flooding a total of 136,090 bbl. has been injected. In the latter part of the year the rate of injection has been reduced to 1,025 bbl. per day. No material increase in oil production has been reported.

Results of Small Operations

Considerable experimenting may be required to evolve methods for applying systematic floods in Illinois on a scale comparable to that of the numerous larger projects in Pennsylvania, Kansas and Oklahoma. Some of the possibilities of flooding have been indicated by a number of favorable results obtained with small scale applied flooding.

In Crawford County, 6 miles southwest of Robinson, six producing wells on three tracts have been benefited by one water input well where injection started September 21, 1942. Between then and December 1, 1943, 34,700 bbl. of untreated water, coming from a pond fed by a spring, has been injected by gravity flow. During the flooding period of little more than a year a 200 per cent increase has been observed in the production of two of the wells affected which would normally have produced 795 bbl. but which produced a total of 2,286 bbl. with an increase of 1,491 bbl. A nearby pair of wells, which would normally have produced 810 bbl., produced a total of 2,347 bbl. with an increase of 1,537 bbl.

To take advantage of the opportunities offered where water sands are above oil sands, an operator in the Allendale pool of Wabash County is reported to have gun-perforated an upper water sand to let water directly down the well to the Biehl sand. Some attention has been given to the possibilities of controlling such a flow by means of a valve-and-packer arrangement.

Studies made of the effects of accidental intrusion of water into wells have indicated that more than 400,000 bbl. of oil have been added to Illinois production over a period of years according to Frederick Squires and Alfred H. Bell, in Report of Investigations 89, Illinois State Geological Survey, entitled "Water Flooding of Oil Sands in Illinois." A survey by them of 27 cases of accidental flooding shows that in most cases the area flooded was 2.5 acres; the maximum area was 12 acres. Typical examples had flood production per acre ranging from 1,141 to 12,121 bbl. with several instances of such production of approximately 5,000 and 7,000 bbl. In discussing natural floods, attention is directed to the advantages of utilizing an applied or artificial flood to supplement the effect of the natural flood. As an example experience at Sandoval in Marion County is cited. Natural floods have demonstrated the effectiveness of water for moving oil and also that many Illinois sands are continuously permeable in extensive areas.

Care Required in Loading Pipe on Rack

THE conditions for many accidents which cause injury to workmen and to equipment and add to the cost by a delay in performing a job are often created through thoughtlessness or carelessness on the part of the workmen or their supervisor. To all the numerous safety slogans there should be added one more pointing out that man is often his own worst enemy.

The weight or load any structure will withstand depends on the weight or load being evenly applied. In some cases, operators will plumb a derrick when it is anticipated that a load approaching the limit is about to be imposed. It is well known that many derricks fail under a load far less than the rated capacity due to one or two legs receiving most of the weight. Any careful workman takes pains to see that the load is evenly distributed.

During the present times workmen are inclined to hurry and not analyze the situation carefully. The accompanying photograph of a string of 7-in. casing on a rack illustrates a job performed without adequate thought to the potential sources of danger. It is a "neat" job as one can see by the staggered casing collars at the photograph at the bottom of page.

However, the load of pipe is not distributed evenly on the rack, although it would have been just as easy to roll the pipe on the rack so that ends projecting over each side would have been equal. As it is, the right projecting ends are approximately five times the length of the left ends. This means that more than two-thirds of the weight of the pipe is on the right sill and less than one-third on the left sill!

Pipe racks are only temporary structures and while ordinarily adequate they have been known to fail when the load was evenly distributed; uneven load distribution will almost certainly cause a later collapse. If they break when no one is around, there are no injuries but some of the pipe may be damaged and a number of hours' effort will be required to get the mess straightened out. If someone should happen to be on the rack, or under it as is sometimes the case, a serious injury or a fatality might result.

And it would be so unnecessary as it is just as easy to place the pipe on the rack with projecting ends equal.

QUESTIONS on TECHNOLOGY

by W. L. Nelson

Numerous Octane Number Methods

Could you furnish us with information on the relationship between octane numbers under the A.S.T.M. method as related to aviation-gasoline methods 1-C and 3-C?—E. M. B.

It is difficult to visualize good enough reasons for the many octane-number test methods that have been developed. Perhaps the many methods that have been developed and the general confusion that exists means that the proper evaluation method for determining detonation characteristics has not yet been developed. Altogether too many discrepancies and too many modifications of the test method have appeared.

In a most general way the octane numbers obtained by the A.S.T.M. motor, and 1-C (lean mixture) methods are about the same. More specifically, octane numbers by the 1-C method are about one unit higher than A.S.T.M. octane numbers when testing fuels whose octane numbers range from 90 to 100. For lower-octane-number fuels (75-85) the same numbers are obtained by both methods. The following tabulation indicates the relationship:

A.S.T.M. and motor method octane number C.F.R. engine	1-C method octane number A.F.D. engine
65	63.5
70	69
80	80
90	91
96	97.5
100	101.0
106	106.0

The research method and 3-C (rich mixture) method are somewhat similar with respect to the octane-number obtained. The research method gives higher octane numbers than the A.S.T.M. method, ranging from 1 to 4 higher for cracked gasoline and sometimes as much as 10 units higher for straightrun gasolines. Somewhat similar results are obtained by the 3-C method, but in addition the 3-C method gives very high octane numbers with fuels that are rich in aromatic hydrocarbons such as those produced from a few select aromatic crude oils and catalytic-cracked stocks.

The motor method was developed because the older research method did not give a high rating (octane number) to cracked gasolines. Similarly, the possibly superior detonation characteristics of catalytically cracked gasolines are not properly recognized by the 1-C method and hence it is necessary to have the 3-C method for these fuels.

Discrepancies in Assigning Vapor Pressure of Methane

I note some confusion on the vapor pressures of methane used in computing the compositions of gases and liquids as in Example 42, page 240 of the second edition of Petroleum Refinery Engineering. Why is a vapor pressure of 4,100 lb. used whereas the Natural Gasoline Supply Men's Association Bulletin for 1941 shows 8,000 lb.?—W. L. W.

The critical temperature of methane is about minus 116° F. which means that (pure) liquid methane cannot exist above this temperature. Thus, any values of the vapor pressure of methane that are given in bulletins, on charts, etc., are purely hypothetical values which can never be experimentally measured. Cautious writers or organizations do not commit themselves on such matters, as will be noted on Figs. 5 and 52 in Petroleum Refinery Engineering, neither of which extends far enough to permit reading of the vapor pressure of methane.

There is need, nevertheless, of a figure or number to represent the vapor pressure of methane in computations. The procedure in such a case is to resort to experimental measurements of the vapor pressures of mixtures which include methane, and such data are usually recorded as equilibrium constants designated by the symbol K. The apparent vapor pressure, or number to be used for vapor pressure, is the product of the total pressure and the equilibrium constant (K). Thus, if the value of K for methane is 17.5, the apparent vapor pressure of methane in a system at 232 lb. pressure, is 17.5 times 232 or 4,060 lb. Undoubtedly such a procedure was used in the Example 42 which is mentioned in the question.

The procedure just outlined is not followed for the purpose of making complications, but to obtain results which more truly represent the behavior of methane when mixed with other materials.

To further complicate the situation, such experimental data as are available are by no means consistent with one another. Thus, the K values and apparent vapor pressures of methane at a temperature of 100° F. and at a pressure of 232 lb. per sq. in. absolute, are somewhat as follows:

Approximate Equilibrium Constants for Methane at 100° F. (and 232 lb. Absolute)

Condition—	K	Apparent V.P., lb./sq. in.
With 75 mol. wt. material	15.00	*3,480
In Mid-Continent crude oil	16.5	†3,830
With 100 mol. wt. material	16.0	‡3,710

*Sage, Hicks & Lacey, Ref. Nat. Gaso. Mfr., p. 350, July 1938, also Pet. Refinery Engineering, second edition, p. 231, McGraw-Hill Book Co., New York.

†Katz and Hackmuth, Ind. Eng. Chem., Vol. 29, 1937.

‡An average. Unpublished average data assembled by a major engineering contracting company.

To the novice the discrepancies inferred by the tabulation are alarming; but if the true complexity of the situation is grasped, the different values shown in the tabulation might have been expected. The behavior of methane is not only a function of temperature and pressure but also of the amounts and kinds of material associated with it, and hence an enormous amount of experimental work must be and is being done to clarify the situation.

With respect to other higher-boiling materials such as propane, butane, etc., which are normally handled at temperatures below their critical temperatures, confusion and discrepancies do not appear.

COST OF ROTARY-DRILLED WELL

THE expense of drilling a given rotary well may be divided between owner and drilling contractor in a number of ways, but barring unexpected drilling difficulties, the total cost of the well remains fixed and the owner pays the entire bill; the drilling contractor merely sells his services during the drilling activities. The actual contract may vary from a "turn-key" job wherein the drilling contractor furnishes everything, including casing, and turns over to the owner a completed well, to a "day-work job" wherein the drilling contractor merely leases to the owner at a stated price per day, his drilling equipment and the owner directs the work and assumes the responsibility for the hole. Generally speaking, the closer a contract approaches a turn-key basis the more desirable it is for both the well owner and the drilling contractor because the owner is relieved of responsibility and the need for supervision and the drilling contractor is permitted full authority and supervision so that he may press the drilling activities without suffering outside interference.

Equitable turn-key drilling contracts can only be based on experience in a given area; development drilling usually establishes, within reasonable limits, casing and mud requirements, drilling time and bit consumption, type of equipment required, and the most satisfactory method of operation. Wildcat drilling, on the other hand, involves the greatest number of unknown factors. For these reasons, a large percentage of the turn-key drilling contracts are found in development drilling and many wildcat wells are drilled on a straight day-work basis. It is not unusual to employ a combination contract in wildcat drilling: a footage contract to a depth which will penetrate those beds about which adequate experience is available to establish reasonably exact drilling costs, and a day-work contract for the drilling below the beds of known characteristics.

The most common arrangement between well owner and drilling contractor is a footage contract whereby the drilling contractor undertakes to drill a well to a stated total depth, on his own responsibility and at his own expense, setting the casing the owner specifies and furnishes. Under this type of contract the contractor receives no money until the contract depth has been reached, but at that time he is entitled to the full amount due him, which is the total depth multiplied by the contract price per foot. He has no interest in the outcome of the well; when he has carried the hole to the contract depth he has fulfilled his obligation; the well owner assumes the risk of success or failure of the well to produce. A day-work rate of pay to the contractor is normally a part of footage contracts so that the owner may have performed certain activities at the well which prevent the drilling contractor from drilling, such as coring, electric logging, drill-stem testing, circulating, etc.

As originally stated, the actual cost of the well may be divided in a variety of ways between owner and contractor, but the more services performed by the contractor the greater will be the contract rate and hence the well owner ultimately pays for all operations connected with the drilling of the well, including a profit to the drilling contractor. Ordinarily the drilling contractor, under a footage contract, furnishes the bits, fuel and water; the cost of the derrick, pits, pipe racks, roads, mud, etc., may be borne by either owner or contractor and the ultimate cost to the owner varies little because a third party usually supplies those facilities; digging the pits, erecting the derrick, building the roads, etc., and hence whether the original bill is rendered to the drilling contractor or directly to the well owner, is of little consequence. The fixed items, such as roads, pits, cellar, pipe racks, moving tools in and derrick are fixed regardless of proposed well depth, therefore, if these items are furnished by the contractor the contract price per foot will be influenced somewhat by the total depth of the well.

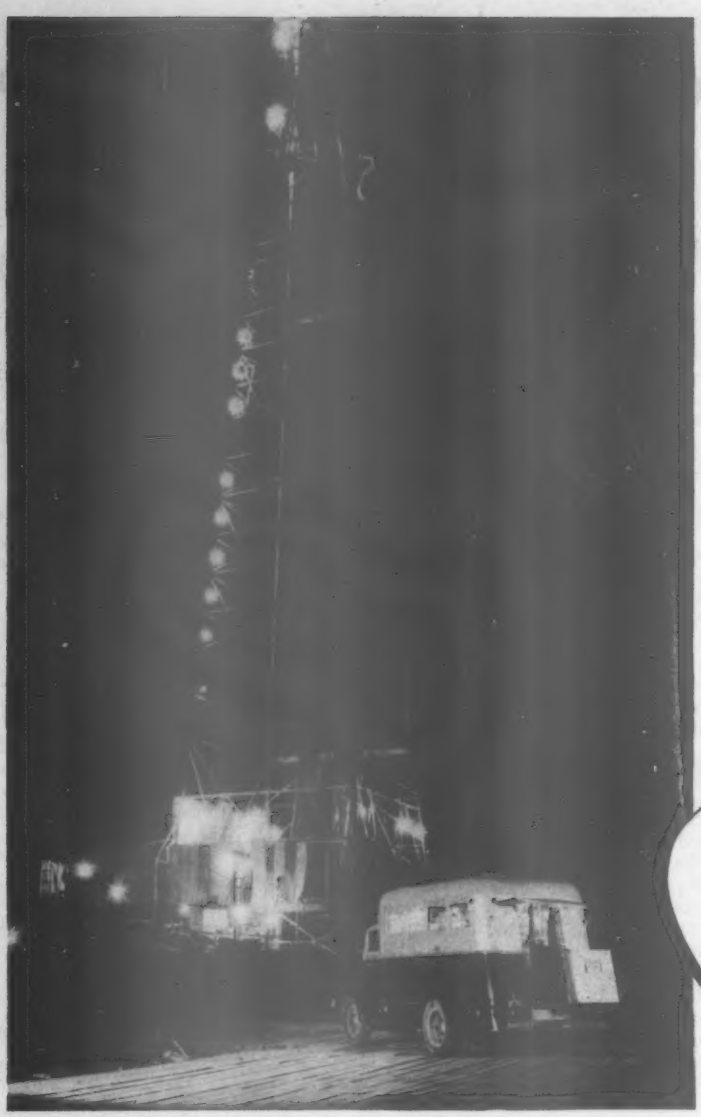
For the purpose of illustration, let it be assumed that experience in a given area has established a contract drilling price of $3.00 per foot and a day-work rate of $350.00 per day with the contractor furnishing bits, fuel and water, and the well owner supplying everything else, and estimate the probable cost to the owner of a 5,000-ft. well in which is set 400 ft. of 10¾-in. o.d. surface pipe and 5,000 ft. of 5½-in. o.d. on the pay after the pay sand has been penetrated to total depth. The drilling contractor will be required to drill out the cement plug from the 5½-in. o.d. using a rock bit on tubing for which the day-work rate will be paid. The charges may be subdivided into three categories:

1. Services performed.
2. Materials used, or expended.
3. Rental or use charge for heavy equipment which will be salvaged at the completion of the well.

ESTIMATE

1. Services—	
A. Drilling contract, 5,000 ft. at $3 per foot	$15,000
Day work—5 days at $350 per day	1,750
B. Dig pits	150
C. Dig cellar	100
D. Build road	200
E. Erect derrick	350
F. Cement casing	350
G. Hauling (cement, mud, casing, etc.	1,500
H. Welding, miscellaneous	300
I. Electric survey	200
J. Owner's geologist, overhead, supervision	2,500
Subtotal	$22,300
2. Expendable materials—	
A. Casing, 400 ft. 10¾-in. o.d. at $1.55 per foot	$ 620
5,000 ft. 5½-in. o.d. at $0.70 per ft.	3,500
B. Tubing—5,000 ft. 2½-in. at $0.40 per foot	2,000
C. Cement	1,000
D. Mud	1,000
E. Casing and tubing heads	500
F. Pipe and fittings for christmas tree	1,000
G. Core heads	200
Subtotal	$ 9,820
3. Equipment rental (original cost less salvage value)—	
A. Derrick	$ 100
B. Lumber and timbers	500
C. Cellar controls	150
D. Core barrel, special tools, etc.	50
Subtotal	$ 800
Grand total	$32,920

It may be seen that while the tubing is run, the christmas tree assembled and the well shut in so that the drilling contractor can move his tools away, no charge to the drilling of the well has been included for flow lines, tanks and separator. The cost to prepare the location for the drilling equipment and the mud costs for drilling different wells varies widely between areas; in swamp land the preparatory work would be many times the cost on hard ground.



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Engineering Fundamentals

No. 122

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

STORMER VISCOSITY OF MUD

IN mud laboratories the Stormer viscosimeter is extensively used for evaluating the viscosity of drilling muds. The instrument, as commonly used, measures the relative apparent viscosities of mud samples at a constant rate of agitation.

Stormer viscosities have no particular application in mud-flow calculations, but they are very useful in comparing the properties of one mud with another and in measuring the effect of various chemicals, temperatures, and other conditions upon mud properties.

This viscosimeter is illustrated in Fig. 1.* The cylindrical spindle A is set-screwed to a vertical shaft which is revolved by the force of the variable weight D attached to the string E through a gear arrangement (not visible in Fig. 1, covered by housing.) The tachometer F indicates the number of revolutions of the spindle. The tachometer scale is so made that movement of the indicator hand from one mark to the next indicates one revolution of the spindle A. There are 100 divisions around the face of the tachometer, so one revolution of the hand indicates 100 revolutions of the spindle A.

* Courtesy Baroid Sales Department, National Lead Co.

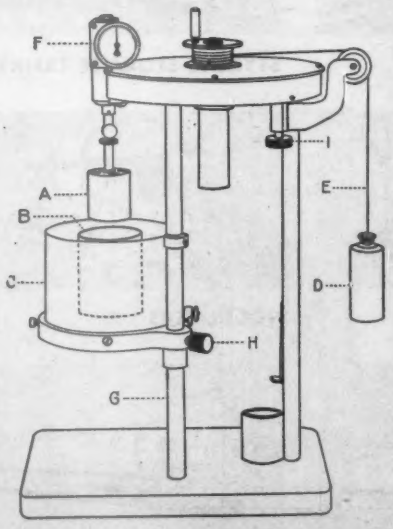

Fig. 1—Sketch of Stormer viscosimeter

In making a viscosity test the mud sample is placed in the cup B which can be maintained at the desired temperature by means of the water bath C. Releasing set screw H, the cup is moved upward so that the spindle is immersed in the mud contained in the cup. Note the stop on support G which aids in getting the proper relative position of the cup and spindle. The weight is now raised by winding the small windlass at the top of the instrument. With the instrument placed to allow free fall of the weight, the brake I is released and a stopwatch started at the instant the tachometer hand passes the first major division on the scale. The stopwatch is stopped when the hand again passes the same major division. Thus, the spindle has turned 100 revolutions and the stop watch indicates the elapsed time.

If the stop watch does not show a time of 10 seconds for the 100 revolutions, weight is added or taken from the string until a subsequent test shows an elapsed time of 10 seconds for 100 revolutions of the spindle. The weight case D is hollow and small metric weights are provided which can be added to or taken from the case.

A calibration chart of the type shown in Fig. 2** is supplied with each instrument.†

The apparent viscosity of the mud in centipoises is obtained by moving vertically upward along the weight value required to produce 600 r.p.m. until the curve is reached and then moving horizontally to the left and reading the vertical scale. As an illustration, on a given test, with the instrument to which the curve of Fig. 2 applies, the driving weight required to produce 600 r.p.m. was 250 gm. The viscosity of the mud is read to be 66.0 centipoises.

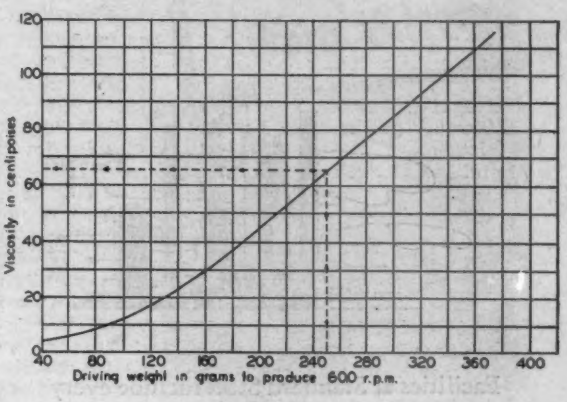

Fig. 2

In using this viscosimeter it is important that certain precautions be observed if reliable results are to be obtained. Some of these are:

1. The clearance between the revolving spindle and the vanes in the mud cup should be kept equal all the way around. This is done by adjusting the four screws on the sides of the bottom of the water bath.

2. A mud sample should always be run through a 80-mesh sieve before it is tested with the instrument.

3. The instrument should be kept clean. This is particularly true of the spindle and cup. Not only should mud incrustations be removed, but also the cup and spindle should be dried with a clean cloth, after washing, before adding a mud sample. Due to the small volume of the sample used, even the water clinging to the cup and spindle surfaces after washing could possibly cause enough dilution and contamination to appreciably change the viscosity reading obtained.

** Reproduction of actual chart furnished with instrument No. 3923 by Baroid Sales Department, National Lead Co.

† Such a chart is constructed by using each instrument to measure the driving force required to revolve the spindle in various liquids of known viscosity (such as oils or glycerin solutions) at a speed of 600 r.p.m.

References

Ambrose, H. A., and Loomis, A. G., "Rotary Drilling Fluids," The Science of Petroleum, Vol. 1, Pg. 448-460, Oxford University Press, (1938).

Descriptive literature furnished by Baroid Sales Department, National Lead Co.

Series prepared by Glenn M. Stearns, associate professor of petroleum engineering, University of Oklahoma

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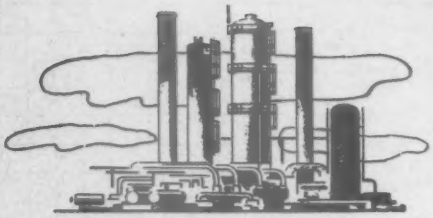

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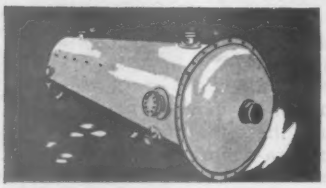
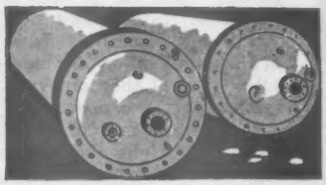
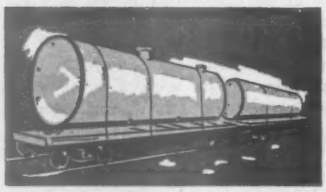


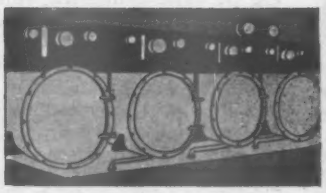
ABSORPTION COLUMNS



AUTOCLAVES

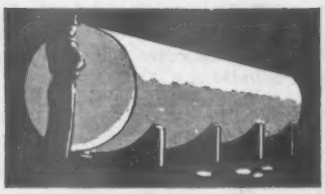


ISO BUTANE REFLEX DRUMS

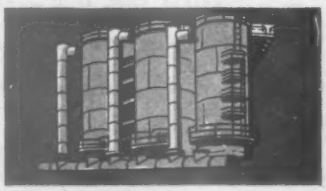


RETORTS

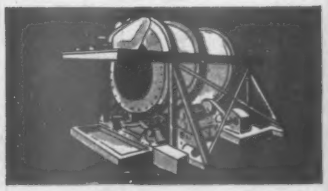
BUBBLE TOWERS



STYRENE STORAGE TANKS



GAS SCRUBBERS



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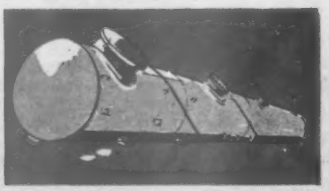

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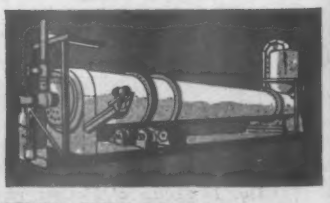

STEAM TUBE ROTARY CONTINUOUS DRYERS

REFINING

Refinery Operations Like Blind Flying, Says Ickes

WASHINGTON, D. C. — Refinery operations are like blind flying in their dependence on instruments, said Harold L. Ickes, petroleum administrator, commenting on efforts to overcome the shortage of control instruments and valves which threatens to retard completion of plants designed to manufacture aviation fuel.

"Before the war," Ickes said, "the instrument manufacturers were supported chiefly by the oil, aluminum and magnesium, iron and steel, and the chemical industries. In 1943 the oil and rubber industry demands alone were greater than the entire production of instruments of any other year. Further, the instruments demanded were of even greater accuracy than those which had been previously required. With the necessity of sharing the instruments with the naval and maritime, iron and steel, and aluminum and magnesium building programs, with munitions and chemical manufacturers, as well as with chemical warfare and the Army Air Forces, there were not enough to meet the mounting demands.

"Five per cent of the over-all cost of a refining unit is its instruments, and the measures taken by PAW in cooperation with industry, to overcome this lack of instruments indicate their importance in the processes of modern refining."

Sketches of Plant Operators

FOLLOWING his graduation in 1929 from Oklahoma A. and M. College, where he had majored in petroleum and acquired a B.S. in mechanical engineering, C. R. McCullough joined Phillips Petroleum Co. as an engineer in the liquefied-gas division. He never had been one to hang around one spot long, and a succession of promotions carried him to his present responsible post, that of mechanical superintendent, in charge of all plant maintenance at the company's biggest refinery, in Borger, Tex.

Assigned to the general engineering department at Bartlesville, Okla., in 1930, McCullough was occupied with equipment design and field engineering in connection with major refinery expansion. A year of gasoline-plant design and construction followed. The young man was transferred in 1933 to the refining department, where he devoted 2 years to statistical work, production accounting, and special assignments. Then he returned to the refinery-equipment design field as job engineer. Soon afterward he was sent to Phillips' Kansas City, Kans., refinery as engineer, later being placed in charge of both plant process engineering and maintenance engineering.

In 1938 McCullough became a design supervisor in the engineering office at Bartlesville, in charge of process and mechanical design for a major expansion program at the Borger refinery. On completion of this program he served as inspector of construction.

Transfer to the refinery process-engineering division came in 1940, and after 9 months McCullough was made chief process engineer, in charge of process and development engineering work at the Borger plant. Another shift, in 1943, made him manufacturing superintendent, in charge of operation, at the Okmulgee, Okla., plant. He served as acting superintendent there pending assumption of his present position.

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NOW worn valves, valve parts and pump sleeves can be reconditioned to outperform new factory parts by a simple oxyacetylene welding application using Stoody 6. This new Stoody alloy, composed principally of cobalt, chromium and tungsten, will not oxidize—even under intense heat, has high impact strength in relation to its hardness, offers excellent resistance to abrasive wear, and is perhaps the easiest of all hard-facing alloys to apply. Stoody 6 is highly efficient for hard-facing new or old internal combustion exhaust valves, gate, globe and angle valves, hot oil pump sleeves, etc.

Trial order of 10 lbs. of 3/16" diameter Stoody 6 at $4.25 per lb. will prove the merits of this alloy for any applications involving heat, corrosion, abrasion and impact. Available on AA-4 or higher priority rating.

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Opening of Butadiene Plant Is Set for February 23

HOUSTON, Tex. — Formal opening of the Neches Butane Products Co. butadiene plant at Port Neches, Tex., has been scheduled for February 23. The first 50,000-bbl. unit of the plant has been finished, and a similar unit will be ready for operation late in the spring. Nationally known figures in the wartime rubber program are expected to take part in the opening ceremonies.

The five oil companies which organized the Neches Butane Products Co. are Texas Co., Gulf Oil Corp., Atlantic Refining Co., Pure Oil Co., and Magnolia Petroleum Co.

Shell to Quadruple Output Of Gasoline at Wood River

CHICAGO. — Output of aviation gasoline will be quadrupled by Shell Oil Co., Inc., at its Wood River, Ill., plant through construction of additional refining facilities, the company announced last week. The Midwest's first fluid catalytic cracking plant was completed last week, and the new unit will start regular production promptly.

Second step in Shell's 1944 expansion at Wood River will be completed within a few weeks. It is another fluid cracking plant. Additional facilities which now are under construction are expected to be completed not later than May.

Midwest Refiners Planning To Increase Crude Runs

CHICAGO. — Officials of 50 independent refining companies of the Midwest region, with an idle daily manufacturing capacity of 205,000 bbl. have pledged themselves to support measures for an increase in the price of crude, provided there are corresponding increases in markets for refined products.

"The interests of the independent refiners and of independent producers as to the necessity of increasing the crude-oil supply are mutual," said B. L. Majewski, vice president of Deep Rock Oil Corp. and chairman of the PAW District 2 marketing commitee. "That is also the interest of the civilian consumer.

"We hope to obtain the kind of action that will not only prevent further reductions in gasoline and fuel oil rations, but restore some of the gasoline and oil that was taken away through rationing. Without more crude oil, which can be obtained only by drilling, this cannot be done.

"The refiners have found sentiment among the consumers to be overwhelmingly in favor of paying a penny or so more a gallon for gasoline or fuel oil in order to get some gasoline or oil."

Work Starts on Cooperative Butane-Butadiene Plant

McPHERSON, Kans. — Work has started on construction of a butane-butadiene unit at the McPherson plant of National Cooperative Refining Association, E. J. Mary, superintendent, announced last week. The output of the unit, an alkylation component of aviation gasoline, will be shipped to refineries making high-test fuel for aviation use.

Canol Refinery Expected to Be in Operation by May

EDMONTON, Alta. — The Canol pipe line and refinery at Whitehorse, Yukon Territory, will "definitely be in operation within the time limit set for completion," according to Maj. Gen. W. W. Foster, Canadian commissioner for defense projects in the Northwest.

General Foster, just back from a 12-day tour of northern Canada and Alaska, said work is progressing satisfactorily on the Canol project. Piping of fuel oil from Norman Wells to Whitehorse and thence to airports along the Alaska Highway will greatly relieve the transportation facilities by air and water, he stated.

After traveling the 1,425-mile Alaska Highway from Dawson Creek, B. C., southern terminus of the road, to Fairbanks, Alaska, by motor car, the commissioner said the road, although constructed for military use, has all the earmarks of a first-class highway, with mileage, grades, curves and culverts clearly marked.

According to earlier official statements the pipe line from Norman Wells to Whitehorse was to be completed in January, and the refinery at Whitehorse was expected to be ready for operation by May next.

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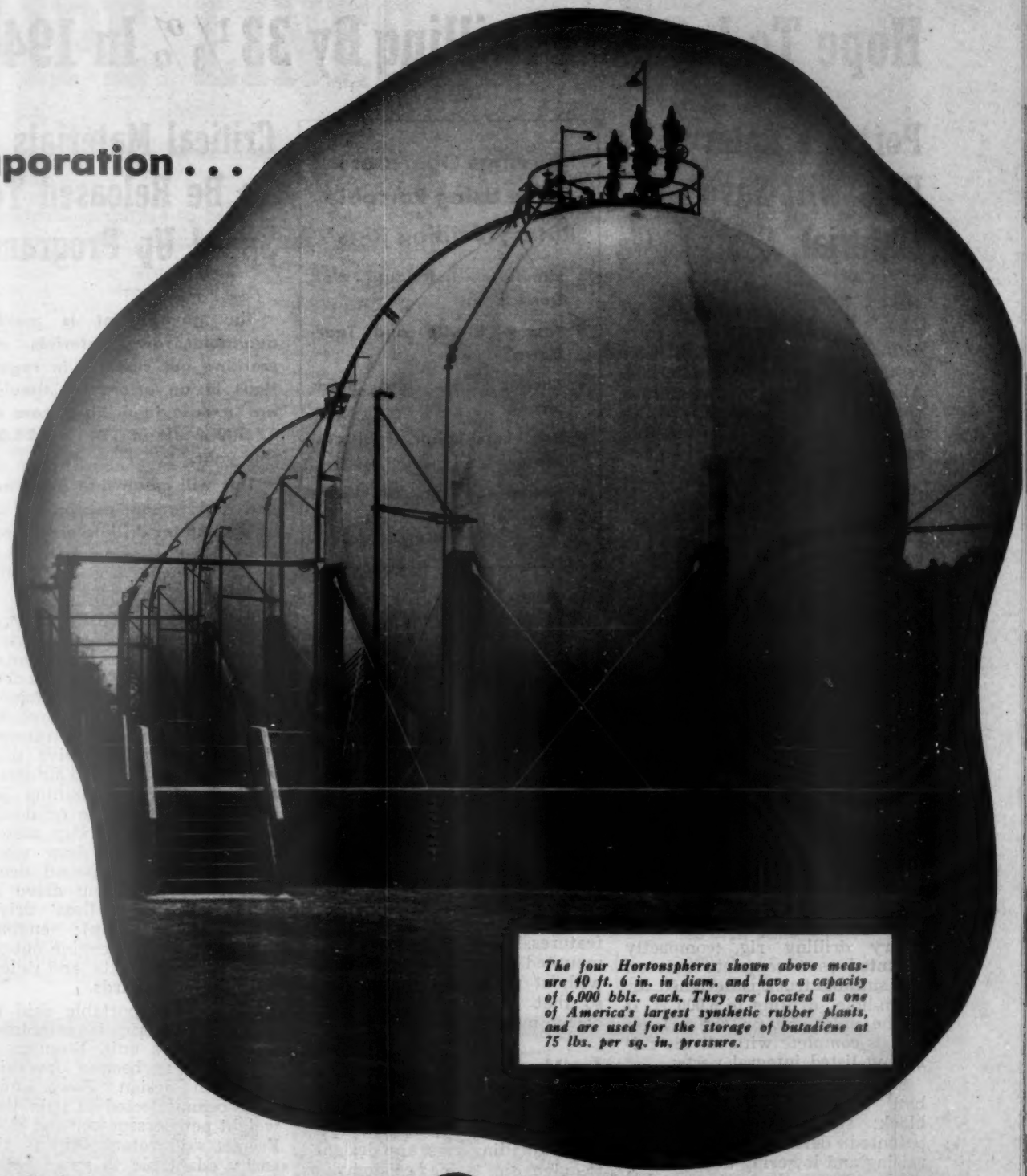

The four Hortonspheres shown above measure 40 ft. 6 in. in diam. and have a capacity of 6,000 bbls. each. They are located at one of America's largest synthetic rubber plants, and are used for the storage of butadiene at 75 lbs. per sq. in. pressure.

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Hope To Increase Drilling By 33⅓% In 1944

Portable Rotary Rigs Will Save Material, Costs

In spite of the releasing of critical items to aid in extending drilling operations, it is still necessary to conserve materials. Also, since the price of crude has not been raised, operators will be faced with making every possible saving.

Equipment which grew out of the late depression period, when savings were the difference between profit and loss, will be valuable in this extension of drilling which is needed to produce more oil for armed services and civilian uses.

Franks Manufacturing Corporation, which pioneered truck mounted portable rotary drilling rigs and the most completely portable skid rigs making possible the ultimate in savings in both standard medium depth, and deep "slim-hole" drilling, will have available some of the needed equipment.

Truck-Mounted Rig For Drilling to 6,000 Ft.

Franks self-propelled portable rotary drilling rig, compactly mounted as a complete unit on any suitable truck is designed for "slim-hole" drilling to 6,000 ft. It is the *only* unit on the market that is *complete* with all the following listed integral parts:

Open face derrick; five-sheave ball bearing mounted crown block; stacking board; Franks patented derrick power screw raising and lowering device; two-engine power plant; power take-off using the power of the truck motor; means of compounding truck motor with identical independent power unit; two slush pumps operating in parallel and independently friction driven; suction hoses (less foot valves); discharge manifolding including high pressure shear relief valves, lubricated plug valves; unibolt union; pump pressure gauge; air chamber; standpipe and gooseneck; rotary hose; swivel; kelly; rotary table with master bushing; drive bushing; drill pipe slips; friction driven rotary table propeller shaft drive including transmission; final friction drive draw works with regular and automatic catheads (friction spinning line cathead, either single or double drum, available at extra cost); controls; all drives fully guarded (folding walkways optional).

Every competitive unit fails to have one or more of these Franks features. These streamlined truck-mounted rigs are also available without pumps and manifolding so that any size independently driven pump may be used.

Most Portable and Complete Skid Rig

Franks portable skid-mounted rotary drilling rigs are designed to give the same economy as Franks truck-mounted rotary drilling rigs at greater depth. The same economies are possible with "slim-hole" drilling to 8,500 feet or standard drilling to 6,000 feet.

The Franks portable skid rotary drilling rig is complete with the following equipment: open face convertible derrick; five sheave ball bearing mounted crown block; stacking board; standpipe; raising boom with blocks; swivel; kelly; pin saver coupling; rotary table with master bushing; drive bushing; drill pipe slips; friction driven rotary table propeller shaft drive including transmission; final friction drive draw works with regular and automatic catheads (friction spinning line cathead, either single or double drum available at extra cost at customer's option); draw works drive; friction compound drive; friction driven pump drive including V-belts (less driven sheave and pump); engines; transmissions and engine out-put shafts with V-belts and idlers; controls; and guards.

The Franks portable skid rotary drilling rig is completely balanced as a unit. Economy of operation has been a governing factor in design. Power units have been selected to gain light weight per horsepower and make Franks skid rotary drilling rigs easily adaptable to any locality. These power units may be Diesel, semi-Diesel, butane, natural gas or gasoline-operated. Power range is from 100 to 200 H. P. per engine in single, double and triple engine set-ups.

Be sure you see Franks (Manufacturing Corp., Tulsa, Okla.) rigs before you buy.

Savings Operators Make Using Portable Rotary Drilling Rigs*

- **Eliminates Individual Well Derrick Cost**
- **Fastest Rig-Up and Tear-Down**
- **Carries Lines and Block Strung**
- **Uses Less Labor, Fuel and Water**
- **Casing Saving by Using Slim-Hole**

*Franks Portable Drilling Rig.

Critical Materials To Be Released To Speed Up Program

The government is making available raw materials and working out changes in regulations in an effort to stimulate an increase in drilling from the 18,000 wells in 1943 to 24,000 this year.

This will mean that much new and replacement equipment will be needed for drilling operations.

Advertisement.

PIPE LINES

Preparations Made to Start Operating WEP 20-in. Line

Alternate pump stations on the Beaumont, Tex.,-Norris City, Ill., section of the War Emergency Pipelines, Inc., 20-in. products line have been put in readiness for moving initial shipments. During the past week installations of gate valves have been made at a number of points where they are essential for operation. By the middle of February it is expected that all essential equipment will be in place for making deliveries through the line all the way to New York. Some work remains to be done on the distribution lines in New Jersey.

Delayed operation of 20-in. line is attributed, according to reports, to three causes: (1) Lateness in obtaining certain valves and other essential materials; (2) defects in pipe made by one of the three processes for fabricating pipe for the main line of the project, and (3) difficulty in procuring sufficient supplies of refined products to pump at a reasonable rate to fill the line. It has been estimated that 3,000,000 bbl. of products will be required for filling the line and for small working stocks. Testing of the line east of Norris City was completed December 8. Testing operations on the western end are nearing completion. Shipments of products from Beaumont may start this week.

Because of difficulty in obtaining products for shipment, it is likely that the system will not be operating above half-capacity until April. Crude oil may be shipped through the WEP 20-in. line later in the year if the scarcity of available refined products continues.

The WEP 24-in. crude-oil line has been delivering at rates varying from 290,000 bbl. to 315,000 bbl. daily and it appears that the daily average for January will be approximately 300,000 bbl., probably exceeding the December shipments. There have been no serious interruptions to operations this month.

Function of Pipe Lines Is Discussed by Ickes

Petroleum Administrator Harold L. Ickes announced that 70,680,000 bbl. of crude oil were delivered to terminals through the big-inch pipe line during the first partial year of its operation.

At its designed pumping rate of 300,000 bbl. a day, Ickes said, the big line "ought to deliver more than 100,000,000 bbl.," during the next 12 months.

"This will aid materially," the administrator declared, 'in keeping the essential East Coast refineries operating and in reducing the amount which must be brought into the East Coast by tank cars, barges and tankers. It has been the biggest single factor making possible the large increase in refinery production on the East Coast."

In a review of the status of the entire pipe-line program, Ickes said that while the extensive system is nearing completion, "it is by no means the whole answer to the over-all

CRC

PIPE LINE CONSTRUCTION EQUIPMENT

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Having constructed many hundreds of miles of oil and natural gas connecting lines during the past years, the I. C. Little organization prides itself on the *thoroughness* of its work. Rainy seasons, snow and zero temperatures; swamps, rivers, precipitous mountains—all have been encountered and overcome in the laying of these lines. In one instance, over 17,500 feet of continuous lines were *pushed* through cypress swampland—where machinery was useless—and ditching was done by blasting.

STOODY SELF-HARDENING MAKES THE DIFFERENCE!

ABOVE are two reclaimed rollers taken from the same tractor. The upper roller was rebuilt to size with high carbon electrodes alone, but the lower roller carried a protective layer of Stoody Self-Hardening over the high carbon build-up*.

Abrasive conditions encountered in tractor operation were so severe the top roller was worn out in three months' time. The Stoody Self-Hardening, however, kept the lower roller in operation for another three-months period, a life increase of 100%!

Cost of the Stoody Self-Hardening deposit can be ignored, considering benefits obtained and the time saved in eliminating an extra overhaul.

Hard-facing can be applied either of two ways: (1) A bead run around the outer edge and space between the bead and collar filled in with horizontal welds or (2) A bead around the outer edge to bring the roller back to diameter, and intervening area between outer edge and collar filled with a continuous spiral of hard metal. Either method is equally successful but the latter has the advantage of more easily maintaining roller concentricity.

Have you received your copy of Stoody Specification Sheets? They illustrate and describe dozens of equipment-saving applications thru the use of hard-facing—sent free on request.

*The preliminary high carbon build-up can be eliminated if Stoody Self-Hardening is applied before excessive wear has occurred on the roller.

STOODY COMPANY
1138 WEST SLAUSON, WHITTIER, CALIF.

STOODY HARD-FACING ALLOYS
Stop wear . . . Eliminate Repair

problem of getting oil to all the places it is needed."

"However," he added, "we should be much more sore-pressed today had not most of these pipe lines been completed."

The administration reports that 14 of the 20 projects authorized 20 months ago were finished and most of them in operation at the end of last year. He said five of the six incompleted lines would be finished by the end of spring and that the remaining one would be in use by late summer.

Mexico Plans Tampico-Mexico City Gas Line

The Mexican Government oil agency last week announced study of plans to construct a gas line from Tampico to Mexico City.

The project, estimated to cost $5,000,000, will pipe gas now being "uselessly" burned at oil fields near Tampico, to the domestic market at Mexico City.

Tennessee Main Line Construction Started

Laying of pipe line for the Tennessee Gas & Transmission Co. Corpus Christi, Tex.,-Charleston, W. Va., 24-in. natural-gas line started at several sections of the main line early this week. Three main-line gangs ot Williams Brothers Corp., directed by Guy S. Connors and supervised by H. L. (Red) Davis, Monroe, La., are operating in the following localities: Gang 2, Thelma Davis, superintendent, Bastrop, La.; Gang 4, Jack Poston, superintendent, Leland, Miss.; Gang 5, George Allen, superintendent, Springfield, Tenn.

For 2 weeks work has been in progress at the following river crossings contracted by Williams Brothers Corp.: Kentucky, Cumberland and Tennessee rivers; Clear Lake in Louisiana, and the Nueces and Trinity rivers in Texas. A new type of bending machine developed by this contractor's organization is being employed.

Wisconsin Court Upholds Right to Lay Pipe Line

MADISON, Wis. — Natural gas, after a series of legislative and judicial setbacks, finally won a round in its fight to obtain a foothold in Wisconsin.

The state Supreme Court held, January 18, that the Wisconsin Railroad Association and the Wisconsin Coal Bureau have no legal right to object to a state Public Service Commission order authorizing construction of a natural-gas pipe line from Lake Geneva, Wis., to the Illinois State line.

The decision reversed the late Judge A. C. Hoppmann of Dane County Circuit Court, who had overruled the commission's demurrer to a complaint by the two associations.

The lower court's action followed two enactments by the 1943 legislature impeding the introduction of natural gas into the state. Yielding to pressure from coal dock, railroad and labor interests, the legislature imposed an allegedly prohibitive tax upon natural gas and added a further obstacle in requiring consent of the municipal governing body before natural gas can be piped into any Wisconsin city.

The commission had granted the Southern Wisconsin Gas Co. a permit to build a 10-mile pipe line connecting with the system of the Natural Gas Pipeline Co. of America.

The railroad and coal men objected on grounds that the Federal Power Commission had sole authority to grant the permit and that natural gas would interfere with established businesses.

Supreme Court's opinion, by Justice Oscar M. Fritz, said the PSC was not interfering with FPC authority because the permit was granted to an existing intrastate utility seeking to provide better service to its patrons under state law.

Holding that the railroad and fuel groups have no legal interest in the matter and that "a remote financial stake therein is not sufficient," Justice Fritz's opinion added this rebuke:

"There is nothing to show that the plaintiff is legally entitled to require the utility to use only such fuels as the railroads can transport."

Several Measures Used To Increase Throughput

To utilize existing pipe-line facilities to the utmost to meet demands for supplying petroleum to the East Coast, a number of measures have been employed by major company systems. These include the "carry-ahead method" for utilizing tanks at pump stations so as to increase efficiency of transportation of batched shipments; shipping of larger quantities of natural gasoline with crude through lines converted to closed system operation; elimination of reduction of throughput by utilizing portable pumping units during periods when equipment is being overhauled; speeding up engines and pumps; and the installation of superchargers for diesel engines. In addition to increasing throughput by such methods, capacity has been raised on several systems by looping and the installation of pumping units.

Natural Gas

FPC Combines Proceedings In Natural-Gas Cases

WASHINGTON, D. C. — Federal Power Commission held a hearing January 26 on applications of Hope Natural Gas Co. and New York State Natural Gas Corp. for permission to construct and operate additional facilities in West Virginia and Pennsylvania and on applications of the Manufacturers Light & Heat Co., Manufacturers Gas Co., Pennsylvania Fuel Supply Co., United Fuel Gas Co. and Home Gas Co. for permission to construct and operate additional facilities in Pennsylvania, West Virginia and New York State.

The commission consolidated the proceedings, since the proposed construction and operation of the facilities involved are for the purpose of meeting substantially the same natural-gas requirements in all the cases.

The Hope and New York State Natural project is to supply the latter company with approximately 15,000,000 cu. ft. of natural gas per day and, in addition, supply about 20,000,000 cu. ft. to United Natural Gas Co., Republic Light, Heat & Power Co., Inc., North Penn Gas Co., Allegany Gas Co., Godfrey L. Cabot, Inc., and Empire Gas & Fuel Co.

The other project is to supply approximately 20,000,000 cu. ft. of natural gas per day to United Natural Gas Co., North Penn Gas Co., Penn-York Natural Gas Corp., and Producers Gas Co.

Natural-Gas and Pipe-Line Companies in Association

KANSAS CITY, Mo. — Representatives of natural-gas producing and pipe-line companies, meeting here last week, organized the Independent Natural Gas Association of America to promote the natural-gas industry in the United States, especially by representing it before legislative and administrative bodies.

Giving producers and pipe-line companies equal representation, the following directors were chosen: M. H. Adams, treasurer Stevens County Oil & Gas Co.; E. Buddrus, president Panhandle Eastern Pipe Line Co.; R. L. Carr, president Columbian Carbon Co.; J. H. Dunn, vice president Shamrock Oil & Gas Corp.; A. B. Harper, president Arkansas-Oklahoma Gas Co.; D. D. Harrington, Hagy, Harrington & Marsh; L. E. Ingham, vice president Kentucky Natural Gas Corp.; P. R. Johnson, president Union Gas System, Inc.; E. C. Joullian, president Consolidated Gas Utilities Corp.; Paul Kayser, president El Paso Natural Gas Co.; Oscar Nelson, president United Carbon Co.; W. G. Skelly, president Skelly Oil Co.; W. H. Wildes, president Republic Natural Gas Co.; C. H. Zachry, vice president Southern Union Gas Co. These directors were to elect officers.

FPC Reports $34,680,000 Saved by Reducing Rates

WASHINGTON, D. C.—Reductions in natural-gas rates ordered or approved by Federal Power Commission have effected savings of $34,680,000 annually for consumers, according to a report which the commission has submitted to Rep. Clarence F. Lea, chairman of the committee on interstate and foreign commerce. The report summarizes the first 5 years of the commission's administration of the Natural Gas Act of 1938, which confers upon the commission responsibility for regulating wholesale rates, accounting practices and certain operations of natural-gas companies engaged in the interstate commerce and, in effect, places every interstate pipeline company under federal control. The commission says need for the act in the field of rate regulation was apparent from the outset, for complaints were filed before a staff could be assembled to handle them. Less than 6 months after the act had been approved, the commission was proceeding with rate cases affecting more than 2,000,000 natural-gas customers and involving, ultimately, $12,204,000 in rate reductions.

Rate reductions, the report says, affect millions of customers in every one of the 29 states in which natural gas is sold in interstate commerce for resale. These have been achieved in formal proceedings or through informal cases and voluntary action on the part of natural-gas companies, based on standards established through formal proceedings.

"Natural-gas rate reductions, approved by the commission," says the report, "represent annual savings to the public of more than 15 times the average annual appropriation for the FPC for the administration not only of the Natural Gas Act but the Federal Power Act and all other statutory duties."

Concluding the report, the commission says concerning the Natural Gas Act: "At the time of its enactment, some doubts were expressed as to whether the fundamental principles which had been found to be applicable to the regulation of utilities having a substantial permanent physical plant could be properly applied to an industry whose property consisted in large part to natural-gas reserves which were being continuously drawn upon in its operation.

Commission to Protect Gas Zone in Cement Deep Field

OKLAHOMA CITY, Okla. — Natural-gas distributors in Oklahoma must exhaust all other sources of supply before the Corporation Commission will permit greater production in the Medrano gas zone of the West Cement field in Caddo County, the commission indicates in an order issued last week.

The order was issued on the application of the city of Pawhuska for increased quantities of natural gas to meet the emergencies of cold weather. William S. Hamilton, Pawhuska city attorney, had asked the commission to increase West Cement allowables so that the Cities Service Gas Co. might increase deliveries of fuel to that city.

In its findings, the commission stated it has authority to increase production of gas fields to as high as 100 per cent of potential of wells "if the same would not create waste."

Natural Gasoline

Barnsdall to Build Gasoline Plant at Midway, Ark.

Barnsdall Oil Co. is to build a gasoline plant in the Midway oil field, Lafayette County, Arkansas. The plant will be located in the center of the field and a pipe line will be constructed to run east. Clearing of location and road building are under way and officials said construction work will begin in about 2 months. There are 40 producing wells in the field with an average depth of 6,300 ft. Gravity of the crude is around 35.6°. Barnsdall is the only active producer in the field, although several other major companies have holdings there.

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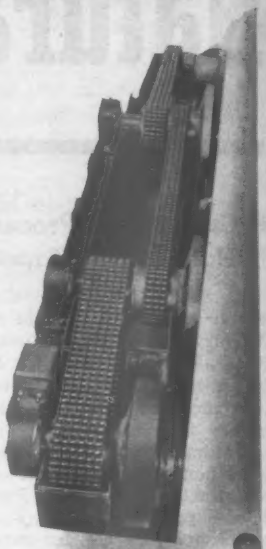

DIAMOND ROLLER CHAINS

Exploration and Drilling

Week's Highlights

CERTAINLY one substantial discovery, preferably two or three, are required in the near future to sustain the current pace of exploratory drilling, according to observers who have been intimately associated with wildcatting over a period of years. Veteran operators who have been through several similar intensive searching eras point out that psychology is a potent factor in maintaining exploratory operations at an abnormal rate, pending actual discovery of sufficient reserves to relieve the demand for more production. There is an indefinable stimulant accompanying each new discovery. Part of the encouragement operators derive from a new field springs from the added knowledge gained from each discovery but there is no denying that the intangible something that effuses from success is in some cases just as potent.

There were approximately 135 new oil discoveries last year, less than 3 per week and some of them were of discouragingly inferior caliber. Despite the lack of singular successes, the industry increased its rate of wildcat completions from an average of 256 for the first 6 months to more than 330 per month in the last half. The temporary lull of exploratory well completions last November was partly offset by a return to the last 6-month average in December and January will prove equally as active. Still, the slump in November may be the first sign of a breakdown in the morale of wildcat operators who are coping with ramified restrictions of every conceivable nature in order to carry on their business at accelerated levels.

Higher prices for farm commodities is not the least of the obstacles now confronting exploratory operations. Landowners, no longer facing such stringent economic conditions, are less receptive to reasonable leasing terms. Some local rationing boards have proven entirely unsympathetic with the necessity for supplemental gasoline rations with which to carry on leasing, title and drilling work. Regulations are being liberalized on equipment but the tighter restrictions on other equally essential phases of exploratory operations are tending to balance the easier supply situation.

Solid line charts current weekly completions

COMPLETIONS IN ALL FIELDS . . .

(Week ended January 22, 1944)

	Oil	Gas	Dry	Total	Footage	Total Comp. to date 1944	1943
N. Y., Penna., W. Va.	36	18	0	54	110,392	170	169
Ohio	3	6	5	14	48,110	48	34
Indiana	5	0	2	7	13,993	14	10
Kentucky	3	2	3	8	17,293	41	4
Illinois	18	0	10	28	71,382	92	101
Michigan	3	0	8	11	38,908	28	28
Kansas	22	3	17	42	128,321	91	72
Nebraska	1	0	1	2	4,495	4	3
Missouri-Iowa	0	0	1	1	965	3	0
Oklahoma	12	3	9	24	82,004	64	80
Texas:							
North Central Texas	13	0	7	20	59,716	55	73
West Texas	19	0	7	26	110,916	87	51
Texas Panhandle	0	0	1	1	3,002	6	16
Eastern Texas	2	0	2	4	23,969	25	14
Texas Gulf Coast	3	0	5	8	60,471	22	29
Southwest Texas	8	0	8	16	65,882	56	56
Total Texas	45	0	30	75	323,956	251	239
North Louisiana	2	4	3	9	33,826	17	16
Louisiana Gulf Coast	5	0	1	6	48,521	20	29
Total Louisiana	7	4	4	15	82,347	37	47
Arkansas	1	0	2	3	13,515	9	11
Mississippi and Southeast	1	0	3	4	17,326	11	1
Montana	4	0	2	6	15,730	13	17
Wyoming	3	0	0	3	14,580	7	9
Colorado, Utah	0	0	0	0	0	1	1
New Mexico	5	0	2	7	25,671	22	15
California	18	0	2	20	68,654	96	48
Total United States	187	36	101	324	1,075,642	1,002	867
Total previous week	189	42	121	352			
Week ending Jan. 23, 1943	161	39	93	293			

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SOUTHWEST TEXAS

Pan American Completion May Open Two New Pays

CORPUS CHRISTI, Tex.—Pan American Production Co. is attempting dual completion in its 1-D Elizabeth Parr and if successful in both pays it will open two new sands for the Thomas-Lockhart field of Duval County. On drill-stem tests the well previously showed oil in both the Cole and Government Wells sands, new zones for the area. This latest test found salt water in the Pettus field sand, although running higher than the 1-B Parr well. Total depth is 4,910 ft. with 5½-in. casing set at 4,013 ft. Through perforations at 3,965-70 ft. in the Government Wells sand the well flowed 38 bbl. of pipeline oil in 2 hours with 950 lb. working pressure. The operator set bridge plug at 3,315 ft. and perforated for a production test in the Cole sand at 3,290 to 3,307 ft.

Standard Oil Co. of Texas temporarily abandoned 1 Justo Chavana et al, 3½ miles southeast of the Alta Mesa field in Brooks County. The well had given promise of opening a new gas-condensate field, but failed to show commercially on production test. Operator was unable to shut off salt water, failing to get a good cement job against the pressure.

The Texas Co. 3 Royal R. Yeager, gas discovery producer about 1¾ miles northwest of the Armstrong field, in Jim Hogg County, was gaged at 6,000,000 ft. of gas per day, open flow, from perforations in gas sand at 2,869-81 ft. This gas discovery is in the R. Garza Survey, 1,082 ft. southwest of the company's 2 Garza dry hole.

Charles E. Fraser, Inc. 1-447 A. M. Bruni estate, 6 miles south of Bruni in Webb County, recovered swab lost in perforations in the Cole sand at 1,793 to 1,812 ft. and the well flowed oil, but gage was not available. Total depth is 1,812 ft.

LOWER GULF COAST WILDCAT COMPLETION

San Patricio County: Texas Conservative Oil Co. 5 Fay Crites, outpost in Midway area, on east flank, dry at 5,341 ft.

SOUTH TEXAS WILDCAT COMPLETIONS

Duval County: American Republics Corp. 1 Mrs. Lizzie Kreis, in AB&M Sur., 228, A-1,889, 3½ mi. E of Kreis field, dry at 4,007 ft.

Jim Hogg County: M. L. Massingill and W. H. Zpice, Jr., et al 1 (232) C. Palacios et al, 2 mi. SE of south end of Randado field, dry at 3,210 ft.

The Texas Co. 1-B E. L. Armstrong et al, extension in Armstrong field, E. L. Armstrong Sur. 297, A-4, pay sand at 3,664-68 ft., 5½-in. 3,662 ft., no perforations, 2-in. 3,650 ft., 153 bbl. through ¼-in. choke, GOR 240, TP 135 lb., CP 500 lb., TD 3,668 ft.

McMullen County: Edwin M. Jones 103 Harry Ezzell, Agt., 10 miles SW of Simmons City, dry at 1,984 ft.

Starr County: Sun Oil Co. 2-B D. D. Oil Co., North Rincon field, new pay discovery, BS&F Sur. 77, top sand 4,365 ft., perf. 20/4,370-75 ft., 146.75 bbl. through ½-in. choke, GOR 493-1, TP 610 lb., Gr. 45.7, TD 5,853 ft.

ROCKY MOUNTAIN

Amsden Discovery Has a Hole Full of Oil

DENVER, Colo.—An important extension of the Gage field, Musselshell County, Montana, appears imminent in Northern Ordnance, Inc., 1 Darr, C SW NW 14-9n-26e. It is bottomed at 6,125 ft., and had the top of the Amsden at 6,087 ft., where tester was set. Open 1 hour it showed 5,600 ft. of clean oil. Location is 1 mile northeast of the discovery, 1 State-Morris, which pumped only 25 bbl. per day from the Amsden at 5,965-6,100 ft. last December, after plugging back from 7,495 ft., at which depth it was 100 ft. in the Madison lime. Northern Ordnance drilled the discovery on a farmout from the Carter Oil Co. Subsequently, and prior to the drilling of the second well, Northern Ordnance acquired the Carter interests subject to an overriding royalty.

White River wildcat testing.—Frontier Refining Co. 1 Government, NW NW 32-2n-96w, Rio Blanco County, Colorado, after plugging back from 7,003 ft., cemented 5½-in. liner at 5,560-6,700 ft., and perforated opposite a sand in the Mesa Verde, topped at 5,558 ft. On first test it showed 360,000 cu. ft. of gas and sprayed 2 bbl. of 47-gravity oil per day. It is being allowed to flow to clean itself and at last reports gas had increased to 500,000 cu. ft. and oil to 7 bbl. a day.

Superior bids in Little dome.—Superior Oil Co. of California was high bidder at auction sale of leases on 1,880 acres in Sections 9, 10, 11, 15 and 16-5n-1w, Little dome, Shoshone Indian land, Fremont County, Wyoming, for $37.60 an acre, a total of $70,688. Sinclair-Wyoming bid $11.18 an acre. The structure is southeast of the Maverick Springs field and has never been tested to the Tensleep.

CALIFORNIA

Test of Promising Wildcat Delayed by Water Trouble

LOS ANGELES, Calif.—Standard Oil Co. of California got a wet job on one of the state's two most promising wildcats and it will be a week before another test will be made. The 1 Bourdieu in the Polvadero district of Fresno County recovered 2,950 ft. of gassy, muddy water and a light gas show. The water is believed to be due to a defective shutoff on the 7-in. which was cemented at 10,320 ft. This wildcat cored 11 ft. of well-saturated oil sand at 10,332-43 ft. and the outlook for production is considered favorable. Discovery of a new field at this point would indicate a concentration of several fields in a restricted area, included in which would be the Coal-

DAILY AVERAGE PRODUCTION FOR WEEK

	Jan. 22 crude oil	Distillate, allied products	Jan. PAW quota all oils	Jan. 15 crude oil
Arkansas	78,400	4,800	81,700	79,725
California	799,650	45,500	873,800	796,500
Colorado	7,880	.....	7,000	7,300
Eastern fields	69,150	9,450	83,350	68,750
Illinois	208,850	12,700	227,700	210,950
Indiana	12,150	.....	14,400	13,150
Kansas	281,050	6,200	291,200	273,000
Kentucky	23,550	3,000	29,000	21,250
Louisiana	358,500	32,000	375,700	358,205
North Louisiana	77,500	.....	.....	77,305
Louisiana Gulf	281,000	.....	.....	280,900
Michigan	51,600	200	56,200	57,100
Mississippi	45,700	.....	48,000	46,700
Montana	24,330	300	23,800	21,325
Nebraska	1,300	.....	1,300	1,500
New Mexico	112,875	6,000	116,600	112,600
Oklahoma	329,800	28,000	356,000	318,800
Texas	1,900,350	126,000	2,018,000	1,899,050
East Texas	366,150	.....	.....	366,200
West Texas	364,700	.....	.....	364,600
North Central Texas	140,475	.....	.....	140,300
East Central Texas	116,525	.....	.....	116,400
Texas Panhandle	98,100	.....	.....	97,900
Texas Gulf Coast	714,900	.....	.....	714,850
Southwest Texas	99,600	.....	.....	99,500
Wyoming	88,230	3,400	103,400	89,710
Total United States	4,391,355	277,550	4,707,150	4,374,695

Total production, January 1-January 22, 1944 ..... 96,283,750 bbl.
Same period last year ..... 84,835,470 bbl.

inga Nose, Pleasant Valley and the northwest end of Kettleman Hills.

Standard and Ethel D Oil Co. are starting work on a deep test of the 35 anticline in the Midway-Sunset field of Kern County and the outcome may determine the status of the Midway-Sunset field as far as deep production is concerned. If this joint test proves productive it will, no doubt, lead to additional deep exploratory work.

Seaboard Oil Co. should know soon whether it will be able to proceed with exploration work involving Elysian Park in the city of Los Angeles as Superior Judge Emmet H. Wilson took under advisement the case of former Councilman Hampton who petitioned the court for an injunction prohibiting Seaboard or any other company from testing the Elysian Park structure. Seaboard proposed to locate a test well outside the park property and whipstock the hole in such a way that it would intercept the Miocene beneath the park. Clearances had been granted from all sources until Hampton filed his action alleging that the project was in violation of the city charter.

Union Oil Co. completed an exceptional flowing well in the Dominguez field of Los Angeles basin when 86 Callender was finished doing 1,464 bbl. of clean 32.4-gravity oil and 1,500,000 cu. ft. of gas daily from the fifth Callender zone at 6,232 ft.

PERMIAN BASIN

Ohio's Well in Fullerton Pool Sets Up Production Record

MIDLAND, Tex. — A new record flow for the Fullerton pool of Andrews County was recorded last week when The Ohio Oil Co. 2 University, on the south edge of the pool, flowed at the rate of 2,636 bbl. of 44.9-gravity oil per day from pay topped at 6,720 ft., with total depth 7,206 ft. The well was treated with a total of 10,500 gal. of acid through perforations. Previous record was held by Fullerton Oil Co. 1 Jackson, which did 2,621 bbl. per day. Frankel Brothers 1 University, 1 mile west of Mid-Continent Petroleum Corp. 1-B University extension, flowed 468 bbl. natural in 22 hours from lower pay topped at 6,921 ft. This zone to total depth of 7,005 ft. is being treated with acid. The upper pay produced 11 bbl. per hour after being treated with 6,000 gal. of acid at 6,819 ft.

Winkler County. — Although running 136 ft. lower than the discovery on top of the Ellenburger, Magnolia 21 State-Walton, 1 mile south outpost to the Kermit-Ellenburger pool, gave indications of extending the pool when a drill-stem test at 10,580-10,625 ft. showed gas and distillate.

Hockley County. — Official completion gage on Woodley Petroleum 1 Harless, new Clear Fork lime discovery in eastern Hockley County, was 161.38 bbl. per day. The pool opener is plugged back to 5,980 ft. from total depth of 6,000 ft. A disappointment was Globe Oil & Refining Co. 1 V. J. Williams, 5 miles northeast of Levelland, abandoned at total depth of 6,412 ft. without showing anything.

WEST TEXAS WILDCAT COMPLETIONS

Hockley County: Globe Oil & Refining 1 V. J. Williams, 660 ft. from N and W, Lab. 2, Lge. 735, State Capitol lands, dry at 6,412 ft.

Woodley Petroleum 1 L. A. Harless, 18 mi. NW of Levelland, 161 bbl., PB to 5,980 ft. from TD 6,000 ft. Discovery, Smyer pool.

Lamb County: E. Constantin, Jr., 1 Effie Ray, 660 ft. from S and E, Lab. 8, Lge. 680, State Capitol lands, junked at 4,374 ft.

Pecos County: Humble 1 O. L. Barnes, H&GN Ry. Sur., dry at 4,525 ft.

Bryce McCandless 1-10 Atlantic, T&St. L Sur., dry at 4,878 ft.

Reeves County: Standard Oil Co. of Texas 1 J. F. Keasler, 4½ mi. NE Toyah, dry at 8,916 ft.

SOUTHEAST NEW MEXICO

HOBBS, N. M.—M. Staniforth 1 State, 27-4n-23e, northwest DeBaca

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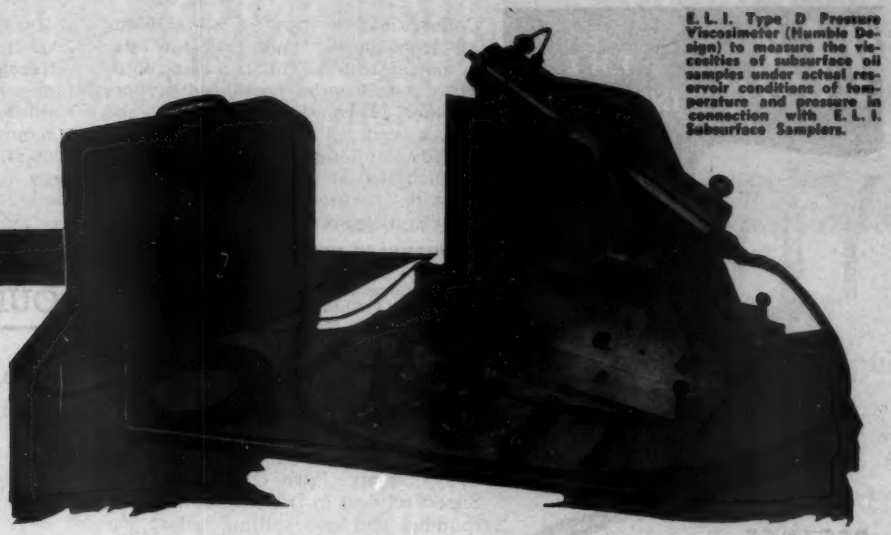

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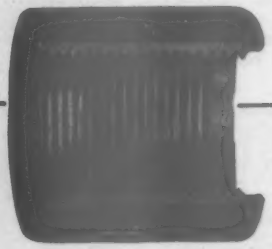

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County, had a show of oil and gas at 1,106-10 ft., and operator was preparing to test. This is a rank wildcat about 20 miles northwest of Fort Sumner. Formation in which the shows occurred has not been determined. Pumping equipment was being installed at Malco Refineries, Inc. 1 State, northwest Lea County, in the Caprock area.

SOUTHEAST NEW MEXICO WILDCAT COMPLETIONS

Chaves County: DeKalb Agricultural Association 1 White, 35-10s-28e, perf. 3,555-70 ft., 3,550-70 ft., and 3,590-3,600 ft., dry at 7,515 ft.

PANHANDLE

AMARILLO, Tex.—Only one completion for the Panhandle district was recorded last week, an oil well in Gray County. Pure Oil Co. 1 J. T. Sneed, wildcat in Dallam County, was spudded and was drilling below 800 ft. Stanolind Oil & Gas Co. 1 W. H. Green, Oldham County, was still trying to free stuck drill pipe at about 6,000 ft., total depth 6,034 ft. Plugging orders were being awaited at Stanolind 1 Troy Broome, Donley County wildcat, which hit granite at 6,748 ft., drilling to total depth of 6,756 ft. It was plugged back and tested at different levels, but developed nothing of consequence.

EASTERN TEXAS

Dual Completion Sought for Smith County Discovery

DALLAS, Tex.—Skelly Oil Co. has asked permission to complete dually its 1 Chisum, discovery in the Sand Flats area of northern Smith County, which has four possible producing zones: Paluxy sand 6,944-7,012 ft., Coquinoid lime 9,030-50 ft., Rodessa 9,225-9,306 ft., Pettit lime 9,844-57 ft. Shows in the Travis Peak lime were not enough to test.

Total depth of the well is 10,000 ft., and operator is perforating and testing the Rodessa horizon. It is intended to test all possible producing zones and to complete from the best two.

Sun Oil Co. 1 Mrs. Alice Patterson, west of the discovery, is coring for Paluxy sand at 7,176 ft. Arkansas Fuel Oil Co. 1 Priscilla Marsh, Hawkins Survey, had Georgetown lime at 5,570-5,600 ft. and was drilling below 5,912 ft.

Morris County: Deepest active wildcat in the district is Humble Oil & Refining Co. 1 H. N. Wright, Story Survey, 1½ miles southwest of Omaha, which is drilling below 11,476 ft. in shale and anhydrite.

Rusk County.—Sinclair Prairie Oil Co. 1 J. R. Graham, in Robert Merritt Survey, 4 miles southwest of Henderson, is a new wildcat location for a Travis Peak test, contracted to 7,500 ft.

Nacogdoches County.—F. K. Lytle 1 James R. Summers, J. Reed Survey, 5 miles east by north of Nacogdoches, is a new wildcat scheduled to go to 9,000 ft.

EAST TEXAS WILDCAT COMPLETIONS

Trinity County: American Liberty Oil 1 Southern Pine Lumber Co., S. H. McClain Sur., dry at 5,016 ft.

LOUISIANA GULF

Humble's Laurel Ridge Test Is Being Closely Watched

NEW ORLEANS, Lt. — The Laurel Ridge area in Iberville Parish is watched with interest as Humble Oil & Refining Co. drills near 11,000 ft. in 1 Federal, 1-11s-13e, and prepares location for a second test, 1 Adam Hymel et al in 91-10s-13e. The 1 Federal had cemented a string of casing to about 10,890 ft. before drilling deeper.

Phillips Petroleum Co. has abandoned 1 A. M. Stewart, wildcat in Grand Marais area about 2½ miles southwest of New Iberia field in Iberia Parish, at total depth 12,500 ft. after running electric log to bottom.

Another test watched closely is Superior Oil Co. of California 1 Continental Land & Fur Co., in 30-18s-14e. This test, in the Bayou Penchant area, Terrebonne Parish, with total depth of 11,277 ft., has set 7⅝-in. protection casing and will be carried deeper. Also in Terrebonne Parish, Union Producing Co. 2 Buckley-Bourge, in 1-20s-16e, Delarge area, is drilling below 9,000 ft. in hard shale.

Failing to find commercial shows, Humble's 1-A V. Zeringue & Sons second hole, in 43-13s-16e, St. James area of St. James Parish, has been abandoned at 11,335 ft.

LOUISIANA GULF COAST WILDCAT COMPLETIONS

Acadia Parish: Sun Oil Co. 1 W. L. Trimble, extension and second well for Egan field, 31-9s-1w, NE of discovery well, perf. 10,480-500 ft., 88 bbl. conden-

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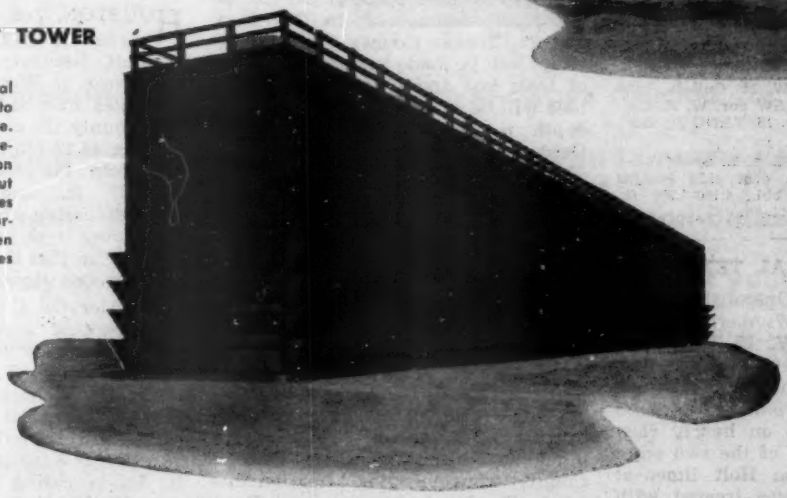

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sate through 3/16-in. choke, TP 3,610 lb., CP 1,600 lb., TD 10,550 ft.

Lafourche Parish: Gulf Refining Co. 4 Delta Securities Co., Lake Bully Camp, 53-19s-2e, junked and abandoned at 11,284 ft.

N. CENTRAL TEXAS

Caddo Lime Production Is Found in Padgitt Pool

WICHITA FALLS, Tex.—New field classification has been requested by Shell Oil Co., Inc., for its new Caddo lime producer in the Padgitt area of northwestern Young County. The Padgitt pool produces from the Mississippi lime. Shell 1-B Scott, Section 334, TE&L Survey, east of the pool proper, topped Caddo lime pay at 4,130 ft. and drilled to a total depth of 5,472 ft., failing to develop production from the Mississippian. It was plugged back to 4,648 ft., perforating casing at 4,190-4,208 ft., and was completed for a 131-bbl. pumper after acidizing with 2,000 gal.

Clay County.—Lacy & Flannery 1 Lyles, 1 mile southwest of Burns-Midway Mississippi lime production, indicated a possible extension for the field when it topped Mississsippi lime showing stain and odor of oil at 6,163 ft. It was drilled to a total depth of 6,234 ft. where 5½-in. casing was run. This will be perforated at 6,163-75 ft., where the best shows were obtained.

NORTH CENTRAL TEXAS WILDCAT COMPLETIONS

Clay County: Shell 1 W. H. Cullers, 1,900 ft. E, 1,600 ft. N of SW cor. W. H. Cullers Sur., but in Sec. 18, T&NO Ry Sur., junked at 6,778 ft.

Young County: Shell 1-B S. L. Scott, 6 mi. NW Newcastle, on east side Padgitt pool, pumped 131 bbl., 4,190-4,208 ft., new pay, TD 5,472 ft.

WEST CENTRAL TEXAS

ABILENE, Tex.—One of the largest producers for the Wimberly pool is R. L. Foree and W. H. Sanford 2 O. J. Fikes, Lot 105, League 126, De Witt County School Land, which registered an initial potential of 4,835 bbl. per day, based on hourly flow after acid treatment of the two pays. The upper pay, the Holt lime, at 2,390 to 2,425 ft., was treated with 1,000 gal. acid, and it flowed 112 bbl. per hour, or at the rate of 2,685 bbl. per day. The lower pay, the Gunsight lime, at 2,470 to 2,530 ft., was treated with 2,000 gal. acid through 20 perforations in the casing, and it flowed 88 bbl. per hour, at the rate of 2,150 bbl. per day. This well is located on the southwest side of the multiple pay field.

WEST CENTRAL TEXAS WILDCAT COMPLETIONS

Jones County: Ungren & Frazier et al 1 E. P. Mayes, T&P Ry. Sur., dry at 2,487 ft.

APPALACHIAN FIELDS

Rate of Operations High in Lower Eastern Fields

PITTSBURGH, Pa.—Rate of operations continues unusually high for January in the lower eastern fields, but chiefly in the gas areas. Operations now total almost 300 for the area. Interest still centers in the deep wildcatting for new producing horizons and new ones are expected in the near future.

In Sherman district, Calhoun County, South Penn Natural Gas Co. completed 2 Miles W. Stump in the Injun sand at 2,164 ft., showing for 6 bbl. of oil and 43,000 cu. ft. of gas, confirming a normal trend in the area which leaves room for additional drilling.

In Carroll district, Lincoln County, a new though probably local producing horizon was struck with completion of a test by Thacker Gas Co. on Charlie Thacker farm in the gas sand at 839 ft. It gages 1,090,000 cu. ft.

In Center district, Gilmer County, Hope Natural Gas Co. has made two locations on the Lewis Bennett farm to confirm the test which came in for 20 bbl. natural, from the Maxton sand at 1,615 ft. and which improved with shot.

The rotary was put in operation in the deep wildcat of Ohio Oil Co. on the Kammerling tract in Dry Fork district, Tucker County. First an attempt will be made to fish two strings of tools lost and if unsuccessful the hole will be sidetracked. Present total depth is 7,979 ft., presumably the Oriskany caprock and a gage of 125,000 cu. ft. gas since it was shut down.

MICHIGAN

Two Discoveries Flowing Oil in Preliminary Tests

SAGINAW, Mich.—Two small wildcat developments, one in Home Township, Montcalm County, the other in Wise Township, Isabella County, were engaging attention this week. The Montcalm discovery, Burk White 1 Jorgenson, in Section 14, was producing 125 bbl. a day. The well is on the northern edge of the Home Township gas field and about 3 miles northeast of the old Home Township oil field.

Cities Service Oil Co., in completing 1 Floyd Methner in Section 33, Wise Township, reported the wildcat flowed 303 bbl. in 18 hours after acid treatment. Production is from the Dundee at 3,696 ft.

The first advance in months in Michigan crude-oil prices was announced last week by Leonard Pipe Line Co. of Mount Pleasant, which now is paying $1.48 per bbl. at the well for crude produced in the Roscommon-Headquarters oil field. The advance is 9 cents per bbl.

MICHIGAN WILDCAT COMPLETIONS

Arenac County, Moffatt Township: Don Rayburn 3 State-Moffatt, C N½ NE NW 33-20n-3e, dry at 2,962½ ft.

Charles W. Teater 1 Mary Szafarn, C N½ SE NE Sec. 30, dry in Monroe formation at 3,255 ft.

Isabella County, Wise Township: Cities Service Oil Co. 1 Floyd Methner, C SE SW NW 33-16n-3w, flowing 303 bbl. first 18 hours, acidized; completed in Dundee formation, TD 3,696 ft.

Lake County, Ellsworth Township: J. C. Glavin 1 Wilder Land Co., C W½ SW SW 35-19n-11w, dry in Monroe formation at 3,799 ft.

Newaygo County, Denver Township: Fisher-McCall Oil & Gas Co., Inc., C N½ NW SE 30-14n-14w, dry in Traverse limestone at 2,265 ft.

Osceola County, Burdell Township: Gordon Oil Co. 1 Larson estate, S½ SE NW 14-20n-10w, dry in Dundee at 3,838 ft.

Ottawa County, Polkton Township: Welsh Oil Co. 1 E. C. Timmerman, SE NW SW 23, dry in Traverse limestone at 1,935 ft.

Tuscola County, Almer Township: Gulf Refining Co. 1 Wiley Lassiter, NE SW SE 5-13n-9e, dry at 4,138 ft.

TEXAS GULF COAST

Seaport Finishes Discovery Well West of Vanderbilt

HOUSTON, Tex.—Seaport Oil Corp. turned in potential finally on 1 Bennett, discovery well about a mile northwest of West Ranch field and 1½ miles west of Vanderbilt in Jackson County. It is a dual completion, making 48.27 bbl. of oil through tubing from the Marginulina zone at 5,063-67 ft. and gas condensate through casing from the Frio zone. Cross-over type packer was set in the hole so that the lower sand might be produced through the casing.

Superior Oil Co. of California finished another triple-sand producer in the Lake Creek field of Montgomery County, at 6-A T. A. McWhorter et al, in T. J. Nichols Survey A-397. One of the sands is a new one for the field. Completion was as follows: Top Wilcox 8,465 ft., total depth 11,249 ft., 7⅝-in. casing set at 10,221 ft., 5-in. set at 9,191 ft., 2⅜-in. tubing set at 9,688 ft. "A" sand was perforated at 9,206-30 ft., flowed 113 bbl. condensate a day and 1,254,000 cu. ft. gas through ¼-in. choke, working pressure 1,210 lb., flowing through annular space between 5-in. casing and the tubing, gravity 58. "B" sand was perforated at 9,730-58 ft., 192 bbl. condensate a day with 2,050,000 cu. ft. gas on ¼-in. choke, working pressure 1,600 lb., flowing through 2⅜-in. tubing, gravity 53. An unclassified new sand for the area was perforated at 8,798 to 8,808 ft., tested

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and shut in pending hearing, with no gage reported.

TEXAS UPPER GULF COAST WILDCAT COMPLETIONS

Jackson County: Seaport Oil Co. 1 John M. Bennett, 1 mi. NW of West Ranch field, 49.27 bbl. through 7/64-in. choke, 24.6 gravity, gas-oil ratio 500, duel completion, with Frio zone, perf. 5,580-84 ft., 2-in. set at 5,554 ft., crossover-type packer, gas condensate and shut in, no accurate gage, TD 5,785 ft.

Jefferson County: Glenn H. McCarthy 1 McFaddin Trust, Sec. 143, T&NO Sur., East Stowell area, abandoned at 10,580 ft.

Wharton County: Seaboard Oil Co. of Delaware 1 W. W. Duson, Sec. 49, ETRR Sur. A-118, 4½ mil NW of Danevang, top sand 6,143 ft., perf. 6,150-54 ft., 185 bbl. through ⅛-in. choke, TP 900 lb., CP 925 lb., Gr. 35, TD 6,160 ft. Discovery El Campo field.

Fort Bend County: H. M. Naylor 2 V. S. Randle, Jane H. Long Sur., 1½ mi. E of Richmond, dry at 9,183 ft.

ILLINOIS

Marine Field Extended North by 480-Bbl. Well

CENTRALIA, Ill.—Only 18 oil wells were completed in Illinois last week. Ten dry hole were reported. The producing wells were headed by Pure Oil Co. 1 Fitch-Brown, C NE NW 23-1n-8e, Clay City Consolidated field, in Wayne County, producing from McClosky lime at 3,054-69 ft., 3,707-09 ft., and 3,131-32 ft. The well pumped 522 bbl. the first 24 hours and later pumped 83 bbl. in 7 hours, following which it pumped 420 bbl. in 24 hours.

Cities Service Oil Co. 2 Ruedger, SE SE NE 32-2s-9e, in the East Barnhill pool, Wayne County, which produced 412 bbl., flowing the first 24 hours from McClosky lime at 3,305-16 ft., total depth 3,372 ft.

Other completions of the week ranged up from 27 bbl. per day in initial production.

In Madison County, Obering, McDonnell and Lord 2 Becker, SE NE SE 9-4n-6w, was flowing 20 bbl. per hour from Devonian lime at 1,670-94½ ft. It extends the Marine field northerly and is the best looking well in the pool thus far.

ILLINOIS WILDCAT COMPLETIONS

Clay County: Sloan et al 1 Sparling, NW NE NE 25-4n-7e, dry at 2,367 ft., Kinkaid 2,028 ft., Tar Springs 2,343 ft.

Hamilton County: William Morrow Layton 1 J. J. Juergens, C SW SE 28-4s-6e, dry at 3,500 ft. Kinkaid 2,266 ft., Tar Springs 2,642 ft., Hardinsburg 2,881 ft., Renault 3,289 ft., Ste. Genevieve 3,372 ft., Fredonia 3,452 ft.

Madison County: O. W. Dickerson 1 Frank Culp, E½ NE NE 36-6n-9w, dry at 200 ft.

White County: W. G. Fortner 1 Questell, NE SW NW 23-5s-9e, dry at 3,282 ft. Barlow lime 2,818 ft., Cypress 2,846 ft., Weiler 2,857 ft., Benoist 2,985 ft., Aux Vases 3,124 ft., McClosky 3,260-63 ft.

CANADIAN FIELDS

Leasing Rules Modified to Encourage Exploration

CHATHAM, Ont.—Under modifications of the rules governing reservations of oil and gas rights in Alberta, it will be possible for an operator to reserve up to 10,000 acres on payment of a fee of $250 in addition to a returnable deposit of $1 an acre as a guarantee that work will be carried out, on the acreage, to that amount. The cash deposit will be returned to the operator as work progresses and expenditures are made, any information obtained in the course of development being furnished the government. Machinery must be on the site within 60 days, and if commercial production is secured, the applicant must lease a selected area. After the deposit has been returned against drilling, the applicant can still establish a credit of 75 per cent of the amount expended against rentals for any leases he may hold, including those drilled.

Jumping Pound.—In the Jumping Pound area, in the Alberta foothills west of Calgary, Shell Exploration Co. 1 Norman, LSD 5, 22-24-5w5, which, at 12,056 ft., established a depth record for Canada, has been abandoned. Sulfur water was found in three porous zones of the Madison limestone, and tests of oil shows in the overlying Blairmore were unsuccessful.

OHIO, KENTUCKY

Gas Well Operations To Be Increased

ZANESVILLE, Ohio.—With oil completions at a minimum due to a lack of profitable drilling areas, independent operators are turning to a search for gas. Approximately as many strings are running now as any time last year, although some are shut down temporarily due to a lack of water and winter conditions. The search is mostly in the deeper areas as the Sandyville, Brush Creek and Zanesville fields. This lack of crude production is discouraging to Pennsylvania Grade refiners, but the increased activity in gas areas is welcomed by the gas distributing companies as there is an acute shortage of gas in the state.

WESTERN KENTUCKY

OWENSBORO, Ky.—Three oil wells and two dry holes, all in established oil areas, were completed in the past week. The oil wells were in Henderson and Union counties; the dry holes

in Henderson and Ohio counties. In the Utley pool, in Union County, Ashland Oil & Refining Co. and Basin Drilling Co. 1 Moore flowed 65 bbl. an hour from McClosky lime at 2,568-76 ft., which had been acidized. The well was shut in, awaiting the building of tanks.

EASTERN KENTUCKY

ASHLAND, Ky. — Two gas-well completions and no oil-well completions were noted in the drilling reports from eastern Kentucky counties this week. One new location was reported. Kentucky West Virginia Gas Co. completed No. 5475 on the Morgan Slone land in Pike County at a total depth of 3,750 ft. in shale with a daily open flow of 300,000 cu. ft. of gas. The same company completed No. 5490 on the Nathaniel Bolen land in Knott County at total depth of 1,575 ft. in brown lime with a daily open flow of 778,000 cu. ft. of gas.

INDIANA

EVANSVILLE, Ind. — Completions of the week were confined to pools in Gibson and Posey counties. The best well of the week started at 66 bbl. a day on the pump. It was completed in Posey County.

KANSAS

Pratt and Barton County Pools Get Extensions

TWO good extension wells were reported last week in Kansas. To the north of the Chitwood pool, Cities Service Oil Co. 1 Rosenbaum, SW SW SE 14-28-12w, headed and made a 1-hour flow after perforating in Simpson sand at 4,387-97 ft. Tanks were being erected to take potential.

Barton County.—Phillips Petroleum Co. and Continental Oil Co. have extended the new Frieb pool ½ mile south at the 1 Frieb in SE SE NW 4-18-14w. The hole filled 1,800 ft. with oil when the plug was drilled in the Arbuckle lime, topped at 3,438 ft. Two other wells are drilling ahead in this area.

Pratt County.—Skelly Oil Co. was still testing at its 1 Dowell, NE SE NE 22-28-12w, after flowing an estimated 25 bbl. of oil and 2,800,000 cu. ft. of gas in sandy dolomite at 4,403-14 ft. Gas was coming from sand at 4,386-93 ft.

KANSAS WILDCAT COMPLETIONS

Butler County: Marion Oil 1 Schweiter, SW NW NE 19-28-8e, dry, TD 2,855 ft.

Graham County: Bridgeport Oil 1-B White, NE NE SE 25-10-21w, dry, TD 3,852 ft. Arbuckle 3,832 ft.

Rice County: Phillips Pet. 1 Click, SE SE NE 3-18-7w, pumped 112 bbl., Misener 3,182-87 ft.

Saline County: Margay Oil 1 Anderson, NW SW 3-16-3w, pumped 413 bbl., Viola 3,363-67 ft., TD 3,505 ft.

Nadel & Gussman 1 Blomgren, NE SE

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SE 24-16-2w, dry, TD 2,730 ft., Mississippi lime 2,708 ft.

Lindsay & Duffield 1 Robson, SE NE NE 12-15-1w, dry, TD 2,658 ft., Mississippi lime 2,618 ft.

Trego County: Sohio Producing Co. 1 Hansen, NE NE NE 19-15-24w, dry, TD 4,619 ft., Mississippi lime 4,500 ft.

OKLAHOMA

Garvin County May Have New Producing Area

A NEW pool 3 miles east of the town of Pauls Valley in Garvin County was showing some promises at the first of the week when Ramsey Petroleum Co. 1 McDowell, NE SE 13-3n-1e, swabbed 3½ bbl. of clean oil an hour in Pennsylvania sands perforated at 2,960-85 ft. The well was drilled to 3,250 ft. but found salt water at 3,170 ft. which was cemented off. This well is offset on the west 40 acres by a dry hole, drilled to 4,601 ft.

Northwest of Pauls Valley, E. J. Kubat 1 Mills, SE SW NE 23-4n-1w, was running low on the Checkerboard lime at 4,008 ft. It is approximately ¾ mile from the nearest well in the field and was reported some 70 ft. lower than the average for the pool. Dry holes in the Wilcox have been drilled approximately 1 mile east and west of this location.

OKLAHOMA WILDCAT COMPLETIONS

Garvin County: C. W. Roodhouse 1 McDowell, SW SW SW 24-3n-1e, dry, TD 3,613 ft., McLish 3,570 ft., dolomite with asphaltic oil at 3,312-18 ft.

Logan County: Gulf 1 Prichard, NW NW 22-17n-3w, flowed 60 bbl. in 24 hr., Layton sand 4,740-66 ft., TD 6,330 ft.

Payne County: The Texas Co. 1 Gunkel, NW SW NE 9-17n-1e, dry, TD 5,215 ft., Misener 4,899 ft., Hunton 4,931 ft., Wilcox 5,140 ft.

Stephens County: Wm. Salzenstein 1 fee, SE SE SW 2-3s-4w, dry, TD 4,001 ft.

LA.-ARK.

Carter Oil Co. to Drill In Lake Bed

SHREVEPORT, La.—Carter Oil Co. was reported to have applied for permits from the War Department to drill two wells in the bed of Catahoula Lake in LaSalle Parish. These tests would be Nos. C-6, 8,517 ft. south and 5,490 ft. east of the northwest corner; and the C-7, 9,811 ft. south and 4,620 ft. east of the northwest corner, both in Section 36-7n-3e.

On the north edge of the Dorcheat-Macedonia field, Columbia County, Phillips Petroleum Co. 1 McWilliams was getting a new master gate and blowout preventer. An attempt to kill the wild well was to have been made late last week.

CRUDE-OIL PRICES

Representative selected crude prices from all sections of the country appear below:

East Texas	$1.26
Conroe	1.43
Tepetate, Louisiana	1.18
Illinois basin	1.37
Pecos County, Texas	.96
Bradford, Pennsylvania	3.00
Van, Van Zandt County, Texas*	1.09

*No change since 5-21-41.

Gravity Schedules

Top prices include all gravities above grades designated, and low prices include all gravities below grades designated:

Gravity—	Signal Hill, Calif.	Oklahoma, Kansas	Gulf Coast Texas	West Texas*
18-18.9	$0.80	....	....	...
19-19.9	.84	....	$1.06	$0.70
20-20.9	.88	$0.85	1.06	.72
21-21.9	.92	.87	1.10	.74
22-22.9	.96	.89	1.12	.76
23-23.9	1.00	.91	1.14	.78
24-24.9	1.03	.93	1.16	.80
25-25.9	1.07	.95	1.18	.82
26-26.9	1.11	.97	1.20	.84
27-27.9	1.15	.99	1.22	.86
28-28.9	1.18	1.01	1.24	.88
29-29.9	1.20	1.03	1.26	.90
30-30.9	1.23	1.05	1.28	.92
31-31.9	....	1.07	1.30	.94
32-32.9	....	1.09	1.32	.96
33-33.9	....	1.11	1.34	.98
34-34.9	....	1.13	1.36	1.00
35-35.9	....	1.15	1.38	1.02
36-36.9	....	1.17	1.40	1.04
37-37.9	....	1.19	1.42	1.06
38-38.9	....	1.21	1.44	1.08
39-39.9	....	1.23	1.46	1.10
40 and above	....	1.25	1.48	1.12

*Includes Lea County, New Mexico.

Entering a New Year—

Our No. 1 job is to keep vital electric power service flowing to all oil and war industries. Hundreds of electric installations feed our electric energy to all phases of the highly important oil industry.

Our No. 2 job is to work with fellow citizens to preserve our democratic system of free enterprise, so that when our American men and women come home, they will find an opportunity to work and to enjoy the rewards of their labor. We must keep America American. This is our duty under the heritage of our American Constitution.

SOUTHWESTERN
GAS AND ELECTRIC COMPANY

MONTHLY WILDCAT COMPLETION RECORD, OCTOBER-DECEMBER

	Oil			Distillate			Gas			Dry			Total		
	Oct.	Nov.	Dec.	Oct.	Nov.	Dec.	Oct.	Nov.	Dec.	Oct.	Nov.	Dec.	Oct.	Nov.	Dec.
Ohio	0	0	0	0	0	0	1	2	2	12	5	7	13	7	9
Indiana	1	1	1	0	0	0	0	0	0	1	3	3	2	4	4
Kentucky	1	1	2	0	0	0	0	0	0	11	3	7	12	4	9
Illinois	11	10	5	0	0	0	1	0	0	25	27	39	37	37	44
Michigan	1	1	0	0	0	0	0	1	1	24	25	23	25	27	24
Kansas	1	4	4	0	0	0	0	0	0	25	39	36	27	43	40
Nebraska-Missouri-Iowa	0	0	0	0	0	0	0	0	0	6	0	2	6	0	2
Oklahoma	3	3	1	1	0	0	3	0	3	19	20	14	25	23	18
Texas:															
North Central	6	4	9	0	0	0	0	0	0	26	30	44	32	34	53
West	1	4	0	0	0	0	0	0	0	6	7	18	7	11	18
Panhandle	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0
East	1	0	0	0	0	0	1	0	0	6	5	11	8	6	11
Gulf Coast	2	0	4	0	0	1	0	0	2	15	28	20	17	28	27
Southwest	3	0	6	0	0	0	1	0	3	20	18	24	24	18	33
Total	13	8	19	0	1	1	2	0	5	73	89	117	88	98	142
Louisiana:															
North	1	1	0	0	0	0	0	1	0	5	6	7	6	8	7
Gulf Coast	0	2	1	1	1	2	0	0	0	2	3	2	3	6	5
Total	1	3	1	1	1	2	0	1	0	7	9	9	9	14	12
Arkansas	0	0	1	0	0	0	0	0	0	4	5	4	4	5	5
Mississippi	2	1	0	0	0	0	0	0	0	9	12	9	11	13	9
Montana	2	2	0	0	0	0	1	3	0	5	3	3	8	8	3
Wyoming	0	0	2	0	0	0	0	0	1	1	0	0	1	0	3
Colorado, Utah	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2
New Mexico	0	1	0	0	0	0	0	0	0	2	3	4	2	4	4
California	1	1	1	0	0	0	1	0	1	12	13	12	14	14	14
Total	37	36	37	1	2	3	6	10	13	238	258	291	286	303	344

THE summary of operations for December reflects the seasonal decrease in total operations. The comparison is made on a 5-week basis for December and a 4-week period the previous month. Oil wells and the active rigs and drilling operations show a small drop in December. On a comparable basis with last month, oil wells are down about 23 per cent. California and the Appalachian area both show a considerable drop in the number of wells completed while the majority of other areas remain at last month's levels.

The monthly wildcat record reveals a slight increase in the total number of completed wells, but on a week-to-week basis is comparable with November operations. December's drilling has been contrary to the usual year-end letup, reflecting stepped up exploration programs that have grown steadily since September. The number of new discoveries, however, has not kept pace with total operations.

Wildcat discoveries in Texas continued to set the pace for remainder of the country. North Texas was particularly active with nine new oil discoveries during December although the ratio of one new oil well to six completions was not particularly impressive. The area reported 53 completions, giving it first rank in December exploratory drilling. The 44 dry holes reported for the area, approximately 83 per cent of the total, compare with a national average of 90 per cent.

SUMMARY OF OPERATIONS, DECEMBER 1943

	Comp.	Oil	Prod.	Gas	Dry	Under 1,000 (ft.)	1,000-2,500 (ft.)	2,500-5,000 (ft.)	5,000-10,000 (ft.)	Over 10,000 (ft.)	Footage	Rigs and drilling
Appalachian	*244	147	281	89	8	1	191	51	1	0	618,340	278
Ohio	112	17	300	50	45	24	38	49	1	0	258,521	181
Indiana	27	14	601	1	12	3	17	7	0	0	54,132	39
Kentucky	69	18	3,783	9	42	10	28	31	0	0	131,030	147
Michigan	53	26	2,945	2	25	0	24	29	0	0	148,642	105
Illinois	181	120	14,620	0	61	4	61	116	0	0	471,686	197
Kansas	198	88	20,201	14	96	1	21	174	2	0	610,137	339
Nebraska	1	0	0	0	1	0	0	1	0	0	4,070	5
Missouri, Iowa	1	0	0	0	1	0	1	0	0	0	2,196	0
Oklahoma	115	53	28,733	12	50	4	35	66	10	0	361,474	382
North Texas	141	67	19,751	0	74	23	49	30	39	0	396,371	99
West Central Texas	25	12	5,273	0	13	4	6	15	0	0	51,848	17
West Texas	81	57	25,808	0	24	0	12	35	34	0	369,707	102
Texas Panhandle	17	16	1,510	0	1	0	0	17	0	0	51,997	8
East Texas	35	15	5,641	4	16	2	0	8	25	0	219,870	44
Upper Gulf Coast	53	28	5,101	5	20	0	1	6	42	4	381,107	92
Lower Gulf Coast	65	35	7,213	8	22	0	1	6	56	2	410,297	108
South Central Texas	3	1	350	0	2	0	1	2	0	0	8,783	15
South Texas	9	1	300	0	8	0	1	6	2	0	36,069	54
Total Texas	429	232	70,947	17	180	29	71	125	198	6	1,926,049	539
Southeast New Mexico	35	26	6,190	0	10	5	3	25	2	0	109,214	35
Arkansas	25	17	2,153	0	8	0	3	7	15	0	105,108	45
North Louisiana	30	17	2,581	5	8	1	16	5	8	0	111,967	50
Louisiana Gulf	34	26	6,395	0	8	0	0	0	24	10	297,515	104
Mississippi	16	3	450	0	13	0	3	9	4	0	78,120	20
Montana	13	12	1,517	0	1	0	6	7	0	0	31,060	93
Wyoming	7	5	4,700	0	2	1	0	3	3	0	30,278	91
Colorado, Utah	7	2	244	0	5	0	5	1	1	0	17,621	27
Northwest New Mexico	1	0	0	0	1	1	0	0	0	0	870	15
California	128	104	17,201	4	20	7	41	57	20	3	433,831	198
Total December	1,726	927	183,847	203	597	91	564	763	289	19	5,801,863	2,890
Total November	1,732	958	197,789	182	592	76	433	933	250	31	5,779,370	2,903

*Does not include 111 input wells.

Market Developments

DEMAND for motor fuel continues to exceed January expectations in practically all districts, tending to accent the critical position of supplies in the Middle West, East Coast and California. A rise of 1,000,000 bbl. per week in the nation's gasoline inventories during the first half of January indicates that the industry will fall considerably behind the expectation that stocks would increase 7.4 million barrels this month. In fact, recent statistical data show that the moderate improvement in California stocks reported for the first week in January was a temporary condition and that the draft on inventories has been resumed.

District 2 refiners and marketers this week took strong issue with an earlier statement by a deputy administrator of OPA who said that it would be necessary to withdraw basic A coupons from all motorists in the Middle West if the European phase of the war continues until fall. Middle West refiners attempted to reassure customers that District 2 would not be singled out for denial of basic rations. It was admitted, however, that the Middle West could not anticipate any relief from the current severity of restrictions on consumption. District 2 refiners renewed their recommendations to the Petroleum Administration for War, the Office of Economic Stabilization and the Office of War Mobilization for changes in tank-car reimbursement regulations that would permit engagement of the 205,000 bbl. of daily refining capacity in the Middle West which now is idle.

Coastal Stocks Earmarked

Deliveries of petroleum products through the War Emergency Pipeline, Inc., 20-in. system will start within a few days. Industry committees in District 3, the area from which bulk of WEP supplies will be drawn, are concerned over ability to fill the requirements for gasoline. Industry leaders frankly admit that any apparent "fat" in current gasoline inventories in District 3 will be liquidated in the first few days of deliveries through the WEP 20-in. system. Numerous Gulf Coast plants are working on a hand-to-mouth basis at the current rate of interdistrict shipments and concede that their operations will be unable to contribute materially to the WEP requirements.

While the supply situation of all major products in District 1 has shown a tendency to tighten further in recent weeks, the major concern is still with kerosene. Efforts to improve the critically low inventory level of this product have been so unsuccessful that further withdrawals from stocks have been necessary.

The slight evidence of weakness in residual fuel oil which was apparent several weeks ago when prices on high-gravity grades were reduced has been entirely dissipated. Most suppliers in the New York Harbor area are now quoting $1.89 per barrel for material of 16 gravity and above. Other prices are generally unchanged with fuel oil of 13 gravity and below selling at $1.65 per barrel and material in the 13-15.9-gravity range being posted at $1.77. Fuel oil of higher than 15.9 gravity had previously been moving at $1.77 due to a short period in which adequate supplies of lower grade products were available.

A.P.I. Refinery Report

Week Ended January 15, 1944

(Figures in thousands of barrels)

	Dly. crude runs to stills	Stocks: Gasoline	Stocks: Residual	Stocks: Gas oil
Appalachian	160	2,887	345	998
Ind., Ill., Ky.	757	16,244	3,129	5,805
Okla., Kan., Mo.	339	7,196	1,083	1,874
Censored area*	2,049	35,506	16,150	19,543
Rockies	113	1,586	631	375
California	766	14,986	33,191	10,504
Total 1-15-44	4,203	78,405	54,529	39,099
Total 1- 8-44	†4,221	77,654	55,731	41,509
Total 1-16-43	3,575	83,585	71,773	42,007

*Reports combined on East Coast, Texas Gulf Coast, Louisiana-Arkansas and Inland Texas as request of PAW. †Revised.

CRUDE-OIL STOCKS

(Bureau of Mines Estimate)

Week ended:	Bbl. of crude*
January 15, 1944	238,148,000
January 8, 1944	236,114,000
January 16, 1943	232,847,000

*Excludes unrefinable in California.

REFINERY PRICE SUMMARY

(Prices as of January 25, 1944)

Quotations are f.o.b. plant in cars and in cents per gallon except where otherwise noted. They are exclusive of the federal excise taxes of 1.5 cents a gallon on gasoline and 4.5 cents a gallon on lubricating oils, and do not include marine lighterage charges.

REFINERY GASOLINE

Octane (A.S.T.M.):	80†	72-74	68-70	63-66
Mid-Continent*	‡6.00-6.25	5.750-6.000	.....	5.625
Gulf Coast	6.00-6.50	§5.750-6.250	§5.750-6.250	§5.250-5.750
Northeast Coast	9.90	9.2	9.2	.....
California	.....	6.25-6.500	5.750-6.125	5.125-5.500

*Basis Group 3. †1939 C.F.R. (research method). ‡Inland Texas and adjoining counties in Arkansas and North Louisiana. §Unleaded.

KEROSENE AND DISTILLATE FUEL OIL

Product—	Kerosene†	No. 2	No. 3	No. 5	No. 6‡
Mid-Continent*	4.125-4.375	3.500-3.625	3.375-3.500	$0.85	$0.80-1.27
North Louisiana*	4.125-4.375	3.500-3.625	.....	.....	0.80-1.27
Pennsylvania	6.000-6.125	5.875-6.125	5.875-6.000	.....	.....
California	4.500-5.500	5.500	5.500	$1.10-1.25	$1.10-1.18
Northeast Coast	6.800	6.700	6.700	1.95	1.85
Gulf Coast	4.125	3.750-3.875	.....	1.25	0.85

*Reflecting OPA ceilings, depending on destination of shipments. †Quotations for 41-43 gravity. ‡Range depends on gravity. §Pacific Specification 300. ¶Pacific Specification 400.

NATURAL GASOLINE

Grades:	26-70	18-55
Oklahoma (Group 3)	4.750	5.700
North Texas	4.375	5.250
North Louisiana	4.375	5.250
California	4.875	5.500

LUBRICANTS

PENNSYLVANIA GRADE—	
Bright stock*, 10 pour point	30.5
Bright stock*, 25 pour point	25.0
Steam refined, 600	15.0
Neutral oil†, 10 pour point	34.0
Neutral oil†, 25 pour point	28-32.5
*No. 8 color, 145-155 at 210, 540-550 flash. †150 vis. at 70 F., 3 color, 400-405 flash.	
MID-CONTINENT—	
Bright stock, 150-160 D, 0-10	23.00
Neutral oil‡, 200-3	15.00
‡0 to 10 pour point.	
GULF COAST—	
Pale oil, 200-3	8.75
Pale oil, 500-3½	10.00

WAX

Oklahoma, 124-126, w.c.s.	4.250
Pennsylvania, 122-124, w.c.s.	4.250
NEW YORK (in bags)—	
Refined, 130-132 (A.m.p.)	7.00
Crude, 124-126 (W.s.)	6.00

TANK-WAGON PRICES

(Gasoline prices based on regular grades in cents per gallon).

	Dealer tank wag.	Combined tax	Kero. tank wag.
Baltimore, Md.	15.95	5.5	10.5
New York	16.10	5.5	10.1
Philadelphia	16.20	5.5	11.9
Washington, D. C.	15.30	4.5	11.3
Chicago	14.10	4.5	10.6
Cleveland, Ohio	14.50	5.5	*9.9
Atlanta, Ga.	18.90	7.5	*11.5
Denver, Colo.	14.50	5.5	11.9
San Francisco	14.50	4.5	11.5
Tulsa	16.50	7.0	8.5

*Includes 1 cent state tax.

Among the

Drilling Contractors

M. B. K. Drilling Co., Odessa, Tex., and Tulsa, has contract to drill a 5,500-ft. rotary wildcat in Yoakum County, Texas, for Neville G. Penrose, Inc. It will be 2 miles southeast of production in the Ownby pool, located in NE NE Section 563, Block D, John H. Gibson Survey, on A. M. Brownfield land.

Parker Drilling Co., Tulsa, has a contract to drill two wells for Gulf Oil Corp. on the O'Brien ranch of northern Ward County, Texas. Gulf recently filed for several permits on this block and on other large undeveloped blocks in West Texas.

Arrow Drilling Co., Tulsa, has contracted to drill a semiwildcat west of the Fullerton pool in Andrews County, Texas, for Anderson-Prichard Oil Corp. It will be the firm's 1 Celia McRae, NE NE Section 1, Block A-48, Public School Land, and the company has signified its intention of drilling eight wells on the half-section lease.

George H. Echols, of Houston, Tex., is contractor for Chicago Mill & Lumber Co. 2 Mutual in the Holly Ridge area of Tensas Parish, Louisiana. This test is 660 ft. north and west of the southeast corner of 12-11n-9e, and is scheduled to go to the Wilcox.

J. I. Roberts Drilling Co. has received from Arkansas Fuel Oil Co. the contract for the latter's 1 Nettie P. Gibson, 653 ft. east and 662 ft. south of NW cor. SW 7-11n-10e, in Holly Ridge area of Tensas Parish, Louisiana.

Glassell Drilling Co., Shreveport, La., will drill for Continental Oil Co. and Standard Oil Co. of Kansas 1 Standard of Kansas fee as a flank test on the old St. Martinville dome of St. Martin Parish, Louisiana, in 137-10s-6e.

Cron & Gracey, Houston, Tex., will drill Shell Oil Co., Inc. 20-B Realty Operators in the northeastern Gibson area of Terrebonne Parish, Louisiana, in 13-17s-15e. It is to be drilled to 9,500 ft. in search of regular field sands.

Jack W. Frazier, Houston, Tex., will drill Cockburn Oil Corp. 1 H. Detering et al unit, new test on the south side of the Dyersdale field in Harris County, Texas. This test is on a 40-acre unit in the Eli Noland Survey, 990 ft. southwest of Frank Gravis 19 Burkitt well, and is to go to 4,100 ft. to try for completion in the regular 4,000-ft. sand.

Allen & Morris, San Antonio, Tex., have the contract to drill Transwestern Oil Co. 2 Albert S. Jank in the Slick-Wilcox field of Goliad County, Texas. The new test is 900 ft. southwest of the 1 Jank location and 900 ft. southeast of Continental Oil Co. 3 Wood, on the south flank, and is in CEPI&M Survey 9.

Milam Drilling Co., San Antonio, Tex., is to drill Sun Oil Co. 1 Pablo

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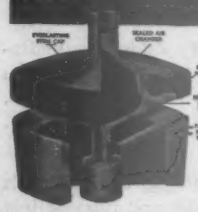

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Rivas et al in the North Rincon area of Starr County, Texas, about 5,800 ft. southeast of the 4,100-ft. sand production and 8,000 ft. south of 4,400-ft. production. The new test is going to 4,425 ft. to try for completion in sands to the 4,400-ft. pay level.

A. J. Slagter, drilling contractor, is drilling Ryan Oil Co. 1 Barrett and Wathen community well, SE NE 17s-10w, Vanderburgh County, Indiana. The well is a G. E. Nelson farmout to Ray Ryan of Ryan Oil Co.

Keating Drilling Co. has the drilling contract on Pure Oil Co. 1 Whitfield, a wildcat in SE SE 1-K-6, Hopkins County, Kentucky, 6 miles northeast of Madisonville. Surface pipe was set at 184 ft., and test was drilling below 660 ft.

Union Drilling & Producing Co. is the contractor on the Sun Oil Co. 1 John and Katie Porte, in C N½ NE NW 15-16n-2w, Midland County, Michigan.

R. M. Perry has been awarded drilling contract on the Socony-Vacuum Oil Co., Inc., 1 Cecil E. Funk, in NW NW SE 9-2s-16w, Van Buren County, Michigan.

Clapsaddle Drilling Co. is drilling on its own account the 2 Sheldon, in SE SW SE 20-2s-16w, Van Buren County, Michigan.

American Drilling Co. was preparing to drill deeper on the State A-1, in S½ SW SW 19-21n-3w, Roscommon County, Michigan, a wildcat which was temporarily abandoned last November. The test will be carried to the Richfield under the deepening program.

Big Chief Drilling Co. has the drilling contract on Indiana Farm Bureau 1 Alva Taylor, wildcat in NW NW 9-9n-9w, Sullivan County, Indiana, which was drilling below 1,616 ft.

E. F. Moran, drilling contractor on Papoose Oil Co. 4 Cooper estate, in NW SW 18-3s-13w, Gibson County, Indiana, was starting work.

Pioneer Drilling Co. has been awarded drilling contract on Carter Oil Co. 1 Vaught, in 20-J-31, Ohio County, Kentucky, location for which has been staked 3 miles northwest of Rochester. This is a Devonian test, pay being expected at 3,500 to 3,800 ft.

Olson Drilling Co. had the contract on Ramsey Petroleum Co. 1 McDowell, in C NE SE 13-3n-1e, Garvin County, Oklahoma. The well was swabbing 3 to 4 bbl. of clean oil an hour, and showing a little gas, through tubing after casing was perforated with 200 shots in a Pennsylvanian sand at 2,960-85 ft.

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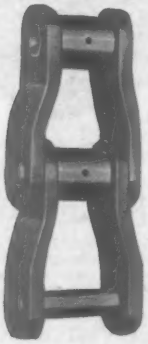

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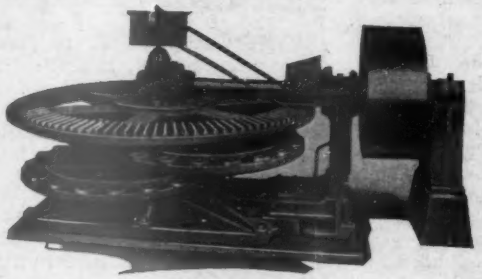

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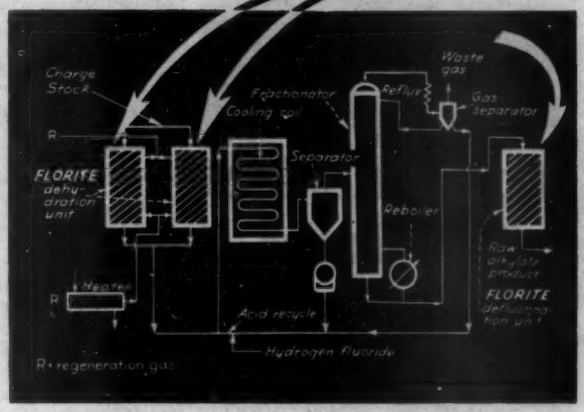
For Aviation Gasoline

Florite* DEHYDRATION UNIT



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Equal or superior to other granular desiccants in drying efficiency and general performance, more economical in use because of longer life under the conditions of service involved, and lower in initial cost than most alternative materials, Florite* has rapidly found its way into exacting processes where drying agents are employed. Hydrofluoric Acid Alkylation of light petroleum fractions, represented by the chart above, is a noteworthy example. Propane, butane, air, nitrogen, carbon dioxide, refrigeration compounds, and various other fluids are successfully dehydrated with Florite. The desiccant is capable of regeneration again and again by heating to 350°F.

Made from bauxite by special processes of activation and mechanical adaptation, Florite uses no highly critical wartime materials and is therefore fully available for any users' requirements. Correspondence is invited.

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PERSONALS

Adams Named Head Of Production Committee

ANNOUNCEMENT by Petroleum Administration for War that K. S. Adams has been appointed chairman of District 2 production committee recalls the fact that when he became president of Phillips Petroleum Co., Bartlesville, Okla., in 1938 he was one of the youngest major oil executives in the country.

Adams has been a member of the production committee since its inception in 1941, with a broad experience in petroleum acquired while serving in various field and office departments of the Phillips organization. He joined Phillips immediately after his graduation from University of Kansas. Promotions carried him to assistant treasurer, treasurer, vice president, and then president, when Frank Phillips left that post to become chairman of the board.

As chairman of District 2 production committee Adams becomes a member of Petroleum Industry War Council and of its national production committee. He succeeds Harold B. Fell, of Ardmore, Okla., who resigned recently on account of ill health.

Commenting on the appointment, Deputy Petroleum Administrator Ralph K. Davies said: "To the wartime job of marshaling all possible resources for increased oil production in the Midwest area, Adams brings a thorough knowledge of the problems involved, a proved administrative ability, and the complete respect of the oil industry. The production committee has an especially urgent assignment that calls for his type of leadership."

David L. Trax, formerly a petroleum engineer for Gulf Oil Corp., Tulsa, has been made assistant director of the materials division, Petroleum Administration for War, after previously serving as special assistant to the director.

Worth B. Andrews, Sr., Fort Worth, Tex., oil operator, has moved his offices to San Antonio, Tex., to be nearer his field of operation. Worth B. Andrews, Jr., recently received his commission in the Army at the cavalry school at Fort Riley, Kansas, and is stationed at Camp Ritchie, Maryland.

Vic M. Roe, rotary drilling foreman for Gulf Refining Co., Michigan division, has been transferred to Oklahoma and attached to Gulf Oil Corp. **W. J. Kleckner** has been transferred from Gulf's Illinois division to succeed Roe in Michigan.

Capt. Ralph J. McBride, Jr., formerly member of a seismic crew, geophysical division of The Texas Co.'s production department, in Houston, Tex., was awarded the Purple Heart following a battle with enemy fighter planes in a combat mission over continental Europe. "Seriously wounded, with one engine and landing gear disabled, Captain McBride landed his plane, after dark, at a strange airdrome without injury to his crew."

New officers of Southeastern Texas section of American Chemical Society, with headquarters in Houston, have been chosen as follows: **Dr. G. H. Richter,** of Rice Institute, chairman; **H. M. Hickey,** Consolidated Chemical Industries, chairman-elect; **B. B. Manuel,** W. H. Curtin & Co., secretary-treasurer. **George R. Gray,** Baroid Sales Division of National Lead Co.; **E. P. Doremus,** J. S. Abercrombie Co. and Harrison Oil Co., and **A. R. Padgett,** Humble Oil & Refining Co., were named councilors. **Cary R. Wagner,** nationally known oil-refining consultant, was the speaker before the section January 21 on "Chemicals From Petroleum."

J. R. Keane was reelected president of Western Asphalt Association at the organization's annual meeting in Los Angeles. **J. R. Pemberton,** former California oil umpire, and **Rush Blodget,** executive vice president of Oil Producers Agency, were elected vice presidents. **C. W. Powell** was reelected treasurer and **Frank L. Mark** was chosen managing engineer.

Joseph Jensen, chief petroleum engineer of the Associated Division of Tide Water Associated Oil Co., and **George J. O'Brien,** vice president of Standard Oil Co. of California, were reelected directors of Los Angeles Chamber of Commerce at the annual meeting last week.

J. Blount Mull, Big Spring, Tex., has been elected vice president in charge of refining for Cosden Petroleum Corp. He joined Cosden in September 1940, as assistant to the president and refinery technologist. He was promoted to manager of refining April 1, 1942. Previously he had worked in petroleum processing operations of Shale Products Co., Elko, Nev.; Producers and Refiners Corp., Parco, Wyo., and Roxana Petroleum Corp., now Shell Oil Co., Inc.

E. G. Trostel, of Petroleum Administration for War's District 5 office in Los Angeles, has been elected chairman of the southern California section, A.I.M.E., succeeding **Walter D. Abel. Walker S. Clute** was reelected secretary-treasurer.

William F. Eggers retired January 16 after 35 years' service as rigger foreman in the mechanical department of the Whiting, Ind., refinery of Standard Oil Co. (Indiana).

Ralph D. Chambers is a new geologist in the Midland, Tex., office of Richfield Oil Corp. Chambers, University of Colorado graduate, was formerly with the U. S. Army Engineers at Little Rock, Ark.

E. A. Kermott, new general manager of the White Eagle division of Socony-Vacuum Oil Co., Inc., has had 37 years' experience in the oil business. He joined White Eagle Oil & Refining Co. in 1921. When Socony acquired White Eagle, Kermott was vice president in charge of production. After the merger he was made vice president and treasurer of the

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JOE T. O'KEEFE, President

newly formed White Eagle Oil Corp., which office he held until dissolution of the company in 1935. Since then Kermott had served as accounting executive of the White Eagle division.

W. W. Wells, former newspaperman and advertising director, has been named secretary of the products conservation committee of Petroleum Industry War Council. It will be his task to centralize and stimulate programs for conservation of critical war materials.

E. A. Steinberger, chief valuation and plant accounting engineer for Lone Star Gas Co., Dallas, Tex., has resigned to enter private practice as a consultant in that city.

James E. Dyer, in the service of Sinclair Refining Co. since it was organized in 1916, has been appointed vice president in charge of sales to succeed the late J. W. Carnes. After a year or two at his first job, that of office boy in a railroad freight office, Dyer entered the oil business as a general utility man for Cudahy Refining Co., soon afterward acquired by Sinclair. Since then he has served in every branch of marketing operations, from warehouseman to district manager. He is a director of Richfield Oil Corp.

John L. Anderson, who was district superintendent of production for Magnolia Petroleum Co. at Electra, Tex., has been transferred to Pampa, Tex., to fill a similar position in the Panhandle district. **O. S. Hodges** has been moved from Lovington, N. M., to take the post vacated by Anderson at Electra.

Paul C. Ford, who was superintendent of installations for Kansas City Gas Co. in Kansas City, Mo., has been made manager of The Gas Service Co.'s properties at Independence, Kans., and the Inter-City district. He takes the place of **Lloyd L. Garner,** forced by ill health to obtain leave of absence.

L. F. Young, superintendent of the Texas-Gulf area for Shell Pipe Line Corp., has been transferred to Cushing, Okla., as superintendent of the Mid-Continent area. **C. D. Winkleman,** general superintendent of Bayou Pipe Line System, has been made acting superintendent of the Texas-Gulf area. The two changes resulted from the resignation of **C. C. Ingram,** who for 14 years had served as superintendent of both areas.

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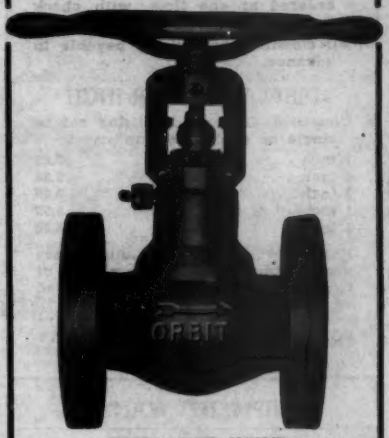
ORBIT VALVES



ORBIT WING VALVE

ORBIT WING VALVE

This valve is especially designed for Wing Service. Made in 2" size only in both flanged and screwed ends. Opening through valve is 1⅛". Seats of cast Stellite J Metal.

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EQUIPMENT WANTED

WANT TO BUY—Grease kettles, pressure and mixing, State type capacity, condition and where located. Box B-951, The Oil and Gas Journal, Tulsa, Okla.

WANTED TO BUY: A small Coring Machine with or without Truck. Give full particulars. Missouri Valley Gas & Oil Co., 9525 East 15th St., Independence, Mo.

WANTED

Unlimited quantity of
Structural Steel — Pipe — Tubing
Casings and Valves, all sizes

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WANTED TO BUY: 250 hp. Scotch Marine Boiler. Must be in first-class condition. Arrow Petroleum Co., Centralia, Illinois.

EQUIPMENT FOR SALE

1,500′ of 17 lb. Seamless 5″ o.d. Inserted Liner pipe, perforated, 75c ft. 100 sets 6⅝″ Extra Heavy Casing Clamps, price single set 5c lb. Ten or more 4c lb. General Tool & Supply, Box 4387, Oklahoma City, Okla.

FOR SALE: One Unit Rig Model U-17 well servicing unit complete with model U-19 spudding drum and attachment, and mast. One Cardwell Model Q single drum pulling unit mounted on V-8 Ford truck. Oil-Well Servicing Co., Pampa, Texas.

FOR SALE: One complete heavy duty rotary drilling rig with 9,100′ of good 4½″ 16.60 lb. drill pipe, first-class condition, now operating, painted and completely unioned throughout, with derrick, substructures and everything necessary to drill. Box C-129, The Oil and Gas Journal, Tulsa, Okla.

FOR SALE: 1 40-hp. 12″x16″ Franklin Oil Engine, Serial No. 4311. Complete with reverse clutch. Utility & Industrial Supply Co., P.O. Box 409, Jackson, Mich.

FOR SALE

Large quantities of 4″ to 12″ Standard and Extra Heavy Screwed and Flanged Cast Iron Elbows, Tees, Crosses, including Flanges. Address:

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ALL POPULAR MAKES

125 HP. 300# W.P. Oil Country Type Newly repaired with new certificates of approval.

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6, Dump, Magor, Automatic, 25-Yd., 50-Ton
8, Dump, Western, Automatic, 27-Yd., 40-Ton
2, Dump, Western, Automatic, 27-Yd., 50-Ton
10, Dump, Koppel, Side-Discharge, 24-Yd., 30-Ton
25, Dump, Magor, Automatic, 30-Yd., 50-Ton
25, Flat, 40-Ft., 40-Ton
55, Gondola, Composite, 36-Ft. and 40-Ft., 40-Ton
150, Hopper, Double, 50-Ton
45, Hopper, Side-Discharge, 50-Ton
16, Refrigerator, 36-Ft., 30-Ton
100, Refrigerator, 40-Ft., 40-Ton
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FOR SALE: 2 Bessemer gas engines—

Number	Bore	Stroke	R.p.m.	Hp.
16429	16″	18″	200	165
16430	14″	16″	180	90

Haws Refractories Co., Box 350, Johnstown, Pa.

FOR SALE: We offer for sale the following equipment, all only slightly used, complete and in good condition: One Reda Pump with Westinghouse 440 V. generator and 3,000′ of electric cable. Three O.C.S. Pump Jacks and 9,000′ of ⅝″ sucker rod. One I.H.Co. 55-hp. Stationary Engine. Two I.H.Co. 20-hp. Stationary Engines. One I.H. Co. 30-hp. Stationary Engine. Call or write L. A. Cage Production Co., Taft, Tex.

FOR SALE: Pulling unit, Waukesha motor and draw works, mounted together on skids. Will take care of anything up to 5,000 ft. In first-class condition. Two new 4″ Centrifugal pumps, 500 g.p.m., 1½-kw. generator, 6-hp. Briggs-Stratton engine. James W. Lomax, 506 Esperson Building, Houston, Tex.

FOR SALE: One Emsco hydromatic draw works, one 12 x 12 engine, one Boykin rotary, one 100 hp. Lucey boiler, one 4-sheave crown block, one 122′ 535,000 lb. steel derrick. Box C-130, The Oil and Gas Journal, Tulsa, Okla.

FOR SALE: At Oklahoma City, 2—Used Cylinders Rebored and Fitted with New Piston Rings and Pin, 12″ x 15″ for Type Y, Style V F & M Vertical Oil Engine—$200 each. Cities Service Oil, Patridge, Bartlesville, Okla.

FOR SALE

60,000 ft. NEW 6⅝″ o.d. 20# J-55 National Seamless Casing 8-Rd Thread.

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